

DA 075680

DISTRIBUTION STATEMENT A

Approved for public release  
Distribution Unlimited

Hum R R O  
DIVISION NO.

JUL 6 1971

P. O. BOX 2086  
FT. BENNING, GEORGIA

UNITED STATES ARMY  
COMBAT DEVELOPMENTS COMMAND  
INFANTRY AGENCY

ASARS II:  
FIRST IN-PROCESS REVIEW  
AFTER ACTION REPORT

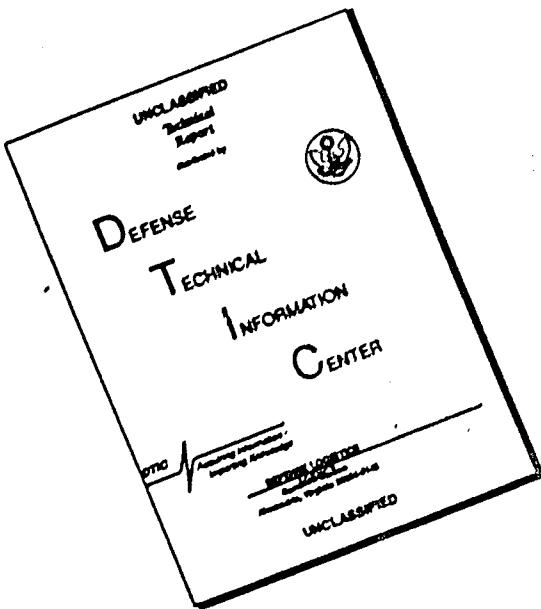
DDC FILE COPY



16-17 JUNE 1971

79 10 26

# DISCLAIMER NOTICE



THIS DOCUMENT IS BEST  
QUALITY AVAILABLE. THE COPY  
FURNISHED TO DTIC CONTAINED  
A SIGNIFICANT NUMBER OF  
PAGES WHICH DO NOT  
REPRODUCE LEGIBLY.



**DEPARTMENT OF THE ARMY**  
ARI FIELD UNIT, BENNING  
U. S. ARMY RESEARCH INSTITUTE FOR THE BEHAVIORAL AND SOCIAL SCIENCES  
PO BOX 2086 FORT BENNING, GEORGIA 31905

PERI-1J

8 August 1979

SUBJECT: Shipment of Documents

Defense Documentation Center  
Cameron Station  
Alexandria, VA 22314  
ATTN: Selection & Cataloging

The Documents in these shipments are approved for public release. The distribution is unlimited.

FOR THE CHIEF:

ALEXANDER NICOLINI  
Major, Infantry  
R&D Coordinator



DEPARTMENT OF THE ARMY  
UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND  
INFANTRY AGENCY  
FORT BENNING, GEORGIA 31905

CDCIN-S

18 Jun 1971

SUBJECT: After Action Report: ASARS II In-Process Review,  
16-17 June 1971

SEE DISTRIBUTION

6  
Army Small Arms Requirements Study II  
(ASARS II): First In-Process Review  
After Action Report  
16-17 June 1971.

1. The first ASARS II In-Process Review (IPR) was held at the Infantry Agency, Fort Benning, Georgia, 16-17 June 1971.

2. Attached are the following inclosures, which constitute the subject after action report:

- a. Inclosure 1 - A copy of the message inviting attendance at the IPR.
- b. Inclosure 2 - Agenda guiding the IPR.
- c. Inclosure 3 - List of attendees at the IPR.
- d. Inclosure 4 - Resume of significant actions taken during the conduct of the IPR.
- e. Inclosure 5 - Detailed outline of the formal presentations, slides and charts presented during the IPR.

FOR THE COMMANDER:

5 Incl  
as

DAVID H. ATCHLEY  
1LT, AGC  
Adjutant

401599

Accession For	
NAME: GMAIL	
CLASS: AB	
UNANNOUNCED	
Justification	
By	
Distribution/	
Availability Codes	
Distr.	Avail and/or special

A B

CDCIN-S

18 June 1971

SUBJECT: After Action Report: ASARS II In-Process Review,  
16-17 June 1971

DISTRIBUTION:

HQ, DA, ATTN:

    OAVCS (1)

    OACSFOR (1)

    OCRD (1)

CG, USACDC, ATTN: CDCCD-F (1)

CG, USACDCCOMSG, ATTN: COMSD (1)

CG, USACDCEC, ATTN: CDCEC-PL-P (1)

CG, USATECOM (1)

CG, USAWECOM (1)

CO, USACDCSAG, ATTN: CDCSAG-AG2 (2)

CO, USACDCMA, ATTN: CDCMA-E (1)

CO, USACDCFAA (1)

CO, USACDCMPA (1)

CO, USACDCAVNA (1)

CO, USACDCEA (1)

Director, AMSAA (2)

CO, USASASA, ATTN: AMXAA-CP/LTC Oddi (1)

AC, USAIS, ATTN: ATSIN-I (2)

CO, USAMTU, ATTN: MAJ Folsom (1)

Chief, USAIHRU, ATTN: HumRRO Div 4 (1)

## JOINT MESSAGEFORM

SECURITY CLASSIFICATION

UNCLASSIFIED

PAGE 1 OF 3	DRAFTER OR RELEASER TIME	PRECEDENCE ACT INFO	LMF	CLASS	CIC	FOR MESSAGE CENTER/COMMUNICATIONS CENTER ONLY		
						DATE - TIME	MONTH	YR
BOOK NO	MESSAGE HANDLING INSTRUCTIONS							

FROM: COUSACDCINA FT BENNING GA

TO: DA

DEPUTY UNDER SECRETARY OF THE ARMY (OR)

CGUSACDC FT BELVOIR VA

CGUSACDCCOMSG FT LEAVENWORTH KS

CGCONARC

CGUSAMC

COUSACDCSAG FT BELVOIR VA

CGUSACDCEC FT ORD CA

COUSACDCMA ABERDEEN MD

COUSACDCARMA FT KNOX KY

COUSACDCFAA FT SILL OK

COUSACDCMPA FT GORDON GA

COUSACDCAVNA FT RUCKER AL

COUSACDCEA FT BELVOIR VA

COUSACDCADA FT BLISS TX

DIRECTOR USAMCSAA ABERDEEN MD

COUSASASA ABERDEEN MD

6  
5  
4  
3  
2  
1  
0

DISTRI:

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE  
MAJ Paone/CDCIN-S/545-2015

SPECIAL INSTRUCTIONS

R E L E A S E R	TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE	
	DAVID H. ATCHLEY, 1LT, AGC, Ad1, 545-	
SIGNATURE	1417	

SECURITY CLASSIFICATION  
UNCLASSIFIED

DD FORM 173

1 JUL 68

REPLACES DD FORM 173, 1 NOV 68 AND DD FORM 173-1, 1 NOV 68, WHICH ARE OBSOLETE.

GPO 13000-00-10-00070-1 200-000

## JOINT MESSAGEFORM

SECURITY CLASSIFICATION

UNCLASSIFIED

PAGE	DRAFTER OR RELEASER TIME	PRIORITY	LNF	CLASS	CIC	FOR MESSAGE CENTER/COMMUNICATIONS CENTER ONLY		
						ACT	INFO	DATE - TIME
2 OF 3		RR		UU				262028Z

BOOK  
NO

## MESSAGE HANDLING INSTRUCTIONS

FROM:

TO:

UNCLAS

CDCIN-S

DA FOR OAVCS, OACSFOR, OCRD, OCDCSLOG; DEPUTY UNDER SECRETARY OF THE ARMY (OR) FOR DR. WILBUR B. PAYNE, ROOM 2E729, PENTAGON; USACDC FOR CDCCD-F; CDCCOMSG FOR COMSD; CONARC; AMC; CDCSAG FOR CDCSAG-AG2; CDCEC for CDCEC-PL-P; CDCMA FOR CDCMA-E; CDCARMA; CDCFAA; CDCMPA; CDCAVNA; CDCEA; CDCADA; AMCSAA; USASASA for AMXAA-CD

Subj: Army Small Arms Requirements Study

A. Study Plan, CSYGIN-S, 3 May 1971, subject:

Army Small Arms Requirements Study II - ASARS II Study Plan

1. Reference Study Plan outlines the conduct of the ASARS II Study.

2. The first ASARS II In-Process Review will be held in Building 241, Infantry Agency, Fort Benning, Georgia, from 0900 hours, 16 June 71, through 1700 hours, 17 June 71. Addressees are invited to attend the conference.

6  
5  
4  
3  
2  
1  
0

DRAFT

0

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE

SPECIAL INSTRUCTIONS

R  
E  
L  
E  
A  
S  
E  
R

TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE

SIGNATURE

SECURITY CLASSIFICATION

UNCLASSIFIED

DD FORM 173 1 JUL 68

REPLACES DD FORM 173, 1 NOV 63 AND DD FORM 173-1, 1 NOV 63, WHICH ARE OBSOLETE.

GPO : 1969 : 60-2077-1 500-500

## JOINT MESSAGEFORM

SECURITY CLASSIFICATION

UNCLASSIFIED

PAGE 3 OF 3	DRAFTER OR RELEASER TIME	PRECEDENCE ACT INFO	LMF	CLASS UU	CIC	FOR MESSAGE CENTER/COMMUNICATIONS CENTER ONLY		
						DATE - TIME 262028Z	MONTH	YR

BOOK

MESSAGE HANDLING INSTRUCTIONS

FROM:

TO:

3. Information packets for attendees of the conference  
will be distributed on 28 May 1971.

4. Request reply by return correspondence indicating  
acceptance or nonacceptance of the invitation for  
attendance.

5. Government transportation on post is limited to taxi  
and bus service. Requests for additional information,  
reservations of quarters, and other administrative  
assistance should be directed to this headquarters,

ATTN: MAJ Paone, AUTOVON 436-3450, ext. 545-2015/2324.

6  
5  
4  
3  
2  
1  
0

0

DISTR:

DRAFTER TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE

SPECIAL INSTRUCTIONS

R E L E A S E R	TYPED NAME, TITLE, OFFICE SYMBOL AND PHONE	SECURITY CLASSIFICATION UNCLASSIFIED
	SIGNATURE 	

DD FORM 173 1 JUL 68

REPLACES DD FORM 173, 1 NOV 63 AND DD FORM 173-1, 1 NOV 63, WHICH ARE OBSOLETE.

GPO : 1969 : 60-28278-1 250-300

AGENDA

16 JUNE 1971

0900-0905	Welcome and Introduction	CO, USACDCINA
0905-0915	Purposes of IPR	USACDCINA
0915-1000	Review of ASARS from SAWS thru ASARS I	USACDCINA
1000-1015	Break	
1015-1045	ASARS II Study Plan.	USACDCINA
1045-1105	ASARS II Program Control	USACDCINA
1105-1125	ASARS II Input Data Collection Plan	USACDCINA
1125-1200	Discussion of Morning Presentation	USACDCINA
1200-1300	Lunch	(Mirror Room) MOOM
1300-1700	ASARS II Battle Simulation Model from Executive Routine thru Phase B Flow Charting	USACDCSAG

17 JUNE 1971

0900-0930	USACDCINA Inputs developed to date	USACDCINA
0930-0950	USACDCSAG developed inputs to date to include use of INA input data	USACDCSAG
0950-1000	Break	
1000-1030	Inputs under development- TEVAD, REFORM, Suppression, Moving Target Data	USACDCINA
1030-1050	Discussion of Inputs	USACDCINA

1050-1100	<b>Break</b>	
1100-1130	<b>Judgmental Studies in Support of ASARS II</b>	USACDCINA
1130-1200	<b>Discussion of Judgmental Studies</b>	USACDCINA
1200-1300	<b>Lunch</b>	(Mirror Room) MOOM
1300-1315	<b>MOE Proposed in ASARS I</b>	USACDCINA
1315-1345	<b>SAG Proposed MOE and Framework of Analytical Program</b>	USACDCSAG
1345-1400	<b>USACDCINA Proposed MOE for Use</b>	USACDCINA
1400-1415	<b>Weapons Performance Characteristics</b>	USACDCINA
1415-1425	<b>Break</b>	
1425-Completion	<b>Discussion</b>	USACDCINA
TBA	<b>Summary</b>	USACDCINA
TBA	<b>Conclusion</b>	CO, USACDCINA

LIST OF ATTENDEES

<u>RANK</u>	<u>NAME</u>	<u>AGENCY</u>	<u>PHONE</u>
COL	Siegrist	CDCINA	545-1316
PL 313	Dr. Bryson, M.	SAGroup	664-3704
LTC	Cioffi, W.	CDC	664-4413
COL	Coyle, M. W.	CDCINA	545-4922
Civ	Simmons, R.L.	AMSA, APG, Md	X-3472
GS-15	Chavet, W. Allan	OAVCS	OX 7-6286
LTC	Henry, Cecil M.	OCRD	OX 5-6091
MAJ	Brooks	COMS Group	552-4520
GS-11	Himes, Robert	CONARC (Infantry School)	545-1159
MAJ	Gaglioti, J.W.	CDCEC	Ext 5120-3475
GS-15	Goldberg, S.	SAG (Ft Belvoir, Va.)	(703) 664-5949
GS-13	Druzwick, J.	SAG	
GS-13	Belknap, W.	SAG	664-5949
GS-11	Carson, K.	SAG	664-5949
MAJ	Davis, S.E.	CDCMA, APG, Md	278-5214
LTC	Baldwin, G.R.	CDCMPA	630-1800
			Ext 4747/3528
COL	Hughes	CDCAV	
Civ	Sudderth, James A.	USAIB	545-7654
Civ	Shanahan	USAIB	545-5916
Civ	Wise	USAIB (TECOM)	545-2164
LTC (Ret)	Bushaw, C.H.	HUMRRO	545-7143
GS-12	Grazier, Charles S.	CDCEA	35-41870
CPT	Peters, R.	CDCFAA	351-5485
Civ	Packard, C.F.	USAWECom (SWERR-S)	433-1700-4534
Civ	Hung	HQ USAWECom (AMSWE-RDR)	Ext 5234/5414
			433-1700
			Ext 5950/4649
MAJ	Folsom	USAMT	
MAJ	Watson, J.	CONARC (Infantry School)	
CPT	Burke, P.J.	CONARC (Infantry School)	545-7474
CPT	Holdsworth, D.R.	CONARC (Infantry School)	545-1060
MAJ	Sines, Kenneth A.	CDCINA	545-7514
MAJ	Mayer	CDCINA	545-2918
GS-15	Follis	CDCINA	545-1316
LTC	Prescott	CDCINA	545-2324
MAJ	Paone	CDCINA	545-2015
LT	Martin	CDCINA	
LT	Angelo	CDCINA	
COL	Bauknight, G.W.	CONARC (Infantry School)	545-7111
MAJ	Thompson	CDCINA	545-2015
MAJ	Mullally, D.E.	USMCLNO, CDCINA	545-3001

RESUME  
ASARS II IN-PROCESS REVIEW  
16-17 JUNE 1971

1. Following the welcome and introduction by the Infantry Agency Commander to the participants of the In-Process Review (IPR), the tasks and agenda were presented.
2. The ASARS background and development through 1970 were presented, to include assignment of proponency for the study to the Infantry Agency.
3. The ASARS II Study Plan, dated 3 May 1971, was presented in detail outlining areas and agencies responsible for completion of specific aspects of the study effort. Two words were added to Task #5 of the ASARS II Tasks listed in the study directive to clarify its meaning.
4. Management programs for the control of the ASARS II overall study and the ASARS II Input Data Collection were presented and their conceptual development and control of the program were agreed to by the IPR participants.
5. The ASARS battle simulation development was presented through the Phase B development. The CAN DO and CAN'T DO aspects and the plan for development of the model was presented. An outline of the executive routine and each of its major contributing subroutines was presented. The following significant conclusions were drawn in the IPR with respect to the simulation:
  - a. Model development should continue as planned.
  - b. The need exists to review the ASARS simulation development upon completion of Phase C flow charting to identify all input requirements.
  - c. Early combined action with AMC agencies is required to define the scope of a potential input data problem.
  - d. Caution must be exercised during development and exercise of the simulation to insure that side effects do not inordinately drive the simulation.
  - e. In application of vegetation data by use of the Small Independent Action Force (SIAP) technique, caution was directed to insure agreement with the Army Engineer map service.

6. ASARS input provided by the Infantry Agency to Systems Analysis Group for development of the simulation was presented and approved. This information consisted of definition of the scope of the simulation and included addition of a winter environment in Germany, which will be simulated.

7. Significant areas of input data under development were presented to the Review participants. The specific areas and their conclusions were:

a. TEVAD and REFORM small scale experiments planned for completion by CDCEC were reviewed. It was pointed out that, if necessary, these experiments may have to be upgraded from reserve experiments to programmed experiments to insure their completion by 1 January 1972.

b. The results and potential application to ASARS II of the Litton Contract on Suppression were presented. The transformation of the Litton ordinal scale to an interval scale was presented and approved as a first approximation by the Review Board. In expansion of the population base permitting the development of this transformation, it was directed that a more representative sample of enlisted and officer personnel be sought, resorting to calling upon the 101st Airborne Division Airmobile in Vietnam, if necessary.

c. The potential application of data available from the Infantry Board's moving target range at Fort Benning to development of a mathematical relation between moving and stationary target probabilities of hit was presented. It was agreed that a simple ratio should be used pending development of detailed data through future experimentation.

d. The potential impact of reliability aspects of weapons performance characteristics were presented. It was recognized that these aspects would have to be incorporated wherever feasible and data sought for application in the simulation. If data could not be collected as required, the need for these data should be established with responsible AMC agencies. CDCMA will implement this action.

8. Related judgmental studies outlined in Annex K to the ASARS I Final Report were presented. It was directed that formal tasking letters implementing specific portions of the ASARS II Study Plan and the ASARS I Final Report should be directed to those agencies responsible for completion of these judgmental studies as soon as possible. These tasking letters would be prepared for the Agency Commander's signature.

9. Measures of Effectiveness for application in the ASARS II study were discussed, and it was agreed that all those proposed MOE should be retained for analysis in the later stages of the simulation development. A framework for application of MOE was presented by the Infantry Agency and agreed to for subsequent consideration in the analytical program.

10. The weapons performance characteristics outlined in the ASARS I Final Report were reviewed for the IPR members. It was agreed that those weapons performance characteristics and the definition found in Annex K and Annex L of the Final Report for ASARS I would be used as a point of departure for application in ASARS II. It was directed that the definitions of terms in the referenced documents be coordinated with those used by AMC agencies which will be providing the input data to resolve any differences. The physical characteristics outlined in these references would be modified as required to support the Phase C model expansion.

11. It was proposed that consideration be given to expanding the scope of this study to include the United States Marine Corps and perhaps other Department of Defense agencies.

**WELCOME AND INTRODUCTION  
INFANTRY AGENCY COMMANDER  
0900-0905 - 16 JUNE 1971**

WELCOMING REMARKS BY CO

GOOD MORNING GENTLEMEN. I WANT TO TAKE THIS OPPORTUNITY TO WELCOME YOU TO THE INFANTRY AGENCY AND FORT BENNING.

THE PURPOSE OF OUR MEETING TODAY IS TO REVIEW THE ARMY SMALL ARMS REQUIREMENTS STUDY (ASARS). THIS IS THE FIRST IPR FOR THE SECOND PHASE OF THE STUDY (ASARS II).

WE HAVE PREPARED AN OUTLINE OF WHAT WE INTEND TO COVER IN THIS TWO DAY IPR WHICH HAS BEEN PROVIDED YOU IN YOUR PRE-IPR INFORMATION PACKETS AND WILL BE DISCUSSED NEXT ON THE AGENDA.

ONCE AGAIN, LET ME EXTEND THE INFANTRY AGENCY'S WELCOME TO THOSE MEMBERS OF THE REVIEW BOARD SEATED AT THE TABLE AND ALL THE REMAINING OBSERVERS.

**PURPOSE AND OUTLINE OF IPR**

**INFANTRY AGENCY**

**0905-0915 - 16 JUNE 1971**

GOOD MORNING GENTLEMEN. MY PURPOSE IN THIS PORTION OF THE BRIEFING IS TO PRESENT THE TASKS WHICH WE INTEND TO UNDERTAKE AND THE AGENDA TO ACCOMPLISH THESE TASKS IN THE CONDUCT OF THE IPR.

I WOULD LIKE TO SUGGEST AT THIS POINT THAT ALL PARTICIPANTS FEEL FREE TO INTERRUPT THIS AND SUBSEQUENT PRESENTATIONS IF YOU HAVE QUESTIONS. IN SOME CASES YOU MAY BE ABLE TO DETERMINE BY THE AGENDA, WHICH I WILL DISCUSS SHORTLY, THAT YOUR QUESTIONS MAY BE ANSWERED LATER, IN WHICH CASE IT WOULD BE APPRECIATED IF YOU WOULD HOLD YOUR QUESTIONS. IF, AFTER ASKING A QUESTION, THE BRIEFER INDICATES THAT IT WILL BE ANSWERED LATER, PLEASE BEAR WITH HIM. EACH OF THE SLIDES SUPPORTING THIS BRIEFING HAVE A LETTER AND NUMBER IN THE LOWER RIGHT HAND CORNER. THIS REFERENCE CAN BE USED IF A QUESTION CENTERS UPON A PARTICULAR SLIDE.

SLIDE 1 OFF

WITH THE PRELIMINARIES OUT OF THE WAY I WOULD LIKE TO PRESENT THE TASKS FACING THIS IPR.

SLIDE 2 ON

AS YOU CAN SEE, WE HAVE NINE SPECIFIC OBJECTIVES TO ACCOMPLISH IN THIS IPR. THE NINTH TASK HAS BEEN ADDED TO THAT WHICH WILL BE FOUND IN YOUR PRE-IPR PACKET. ITS PURPOSE IS TO SPECIFY THOSE WEAPONS PERFORMANCE CHARACTERISTICS WHICH WILL BE USED IN PHASE C MODEL DEVELOPMENT AND WILL BE DISCUSSED IN DETAIL LATER.

PAUSE

SLIDE 2 OFF

TO SUPPORT ACHIEVEMENT OF THESE OBJECTIVES:

SLIDE 3A ON

THE AGENDA DEPICTED ON THIS SLIDE HAS BEEN DEVELOPED:

(EXPAND ON EACH AGENDA ITEM)

SLIDE 3A OFF

SLIDE 3B ON

SLIDE 3B OFF

THIS, GENTLEMEN, IS THE PLAN FOR THE IPR. ARE THERE ANY QUESTIONS?

ASARS II 1st IPR TASKS

REVIEW

- I. ASARS PROGRAM.
- II. ASARS II MANAGEMENT PROGRAM.
- III. ASARS II INPUT DATA COLLECTION PLAN.
- IV. ASARS BATTLE SIMULATION.
- V. ASARS II INPUT DEVELOPED TO DATE.
- VI. ASARS II INPUT UNDER DEVELOPMENT.
- VII. ASARS II RELATED AND JUDGMENTAL STUDIES.
- VIII. ASARS MEASURES OF EFFECTIVENESS.
- IX. WEAPONS PERFORMANCE CHARACTERISTICS.

AGENDA

16 JUNE 1971

0900 - 0905	WELCOME
0905 - 0915	PURPOSE
0915 - 1000	REVIEW OF ASARS (SAWS THRU ASARS II)
1000 - 1015	BREAK
1015 - 1045	ASARS II STUDY PLAN
1045 - 1105	ASARS II PROGRAM CONTROL
1105 - 1125	ASARS II INPUT DATA COLLECTION PLAN
1125 - 1200	DISCUSSION
1200 - 1300	LUNCH
1300 - 1700	ASARS II BATTLE SIMULATION
1700 - 1900	COCKTAIL PARTY

AGENDA (CONTINUED)

17 JUNE 1971

0900 - 0930	USACDCINA INPUTS
0930 - 0950	USACDCSAG INPUTS
0950 - 1000	BREAK
1000 - 1030	INPUTS UNDER DEVELOPMENT
1030 - 1050	DISCUSSION OF INPUTS
1050 - 1100	BREAK
1100 - 1130	JUDGMENTAL STUDIES
1130 - 1200	DISCUSSION
1200 - 1300	LUNCH
1300 - 1315	MOE PROPOSED IN ASARS I
1315 - 1345	SAG PROPOSED MOE AND ANALYTICAL PROGRAM
1345 - 1400	USACDCINA: MOE FOR USE
1400 - 1415	WEAPONS PERFORMANCE CHARACTERISTICS
1415 - 1425	BREAK
1425 - COMPLETION	DISCUSSION
	TBA
	TBA
	CONCLUSION

REVIEW OF ASARS

SAWS THROUGH ASARS I

INFANTRY AGENCY

0915-1000 - 16 JUNE 1971

ASARS II BRIEFING 1ST IPR

JUNE 1971

COVER SLIDE ON

THE PURPOSE OF THIS PORTION OF THE BRIEFING IS TO PROVIDE AN INSIGHT INTO THE ORIGIN AND ACCOMPLISHMENTS THRU JUNE 1970 IN THE ARMY SMALL ARMS REQUIREMENTS STUDY (ASARS).

SLIDE 2 ON

THE ORIGIN OF ASARS CAN BE TRACED BACK TO THE ARMY SMALL ARMS WEAPONS SYSTEMS PROGRAM (SAWS), ORIGINATED IN 1965. THIS SLIDE WILL BE LEFT ON FOR THE REMAINDER OF THIS PRESENTATION TO FACILITATE YOUR REFERENCE AS WE PROGRESS THROUGH THE PROGRAMS DEPICTED. RETURNING TO SAWS--

COVER SLIDE OFF

SAWS HAD ASSIGNED TO IT THREE OBJECTIVES. THESE OBJECTIVES ARE LISTED ON THIS NEXT SLIDE.

SLIDE 3 ON

PAUSE

I WOULD LIKE TO DRAW YOUR ATTENTION TO THE FIRST OBJECTIVE. YOU SHALL SEE THIS, OR A SIMILAR OBJECTIVE, APPEAR THROUGHOUT THIS PRESENTATION.

SLIDE 3 OFF

THE SAWS STUDY WAS COMPLETED IN 1966 AND RESULTED IN SEVERAL RECOMMENDATIONS, ONE OF WHICH WAS TO INITIATE A COMPREHENSIVE DATA COLLECTION EFFORT AND DEVELOPMENT OF A COMPUTER SIMULATION MODEL WHICH CAN EVALUATE TWO-SIDED SMALL ARMS ENGAGEMENTS. THESE RECOMMENDATIONS WERE IMPLEMENTED BY DA IN 1968 BY THE CREATION OF THE ARMY SMALL ARMS PROGRAM (ARSAP). THE PURPOSE OF ARSAP WAS TO COORDINATE THE ARMY'S SMALL ARMS PROGRAMS AND INCLUDED WITHIN

IT THE ARMY SMALL ARMS REQUIREMENTS STUDY. WE HAVE PROGRESSED NOW FROM 1965 THRU THE EARLY PORTION OF 1968 AND HAVE ESTABLISHED THE ASARS STUDY, AS PART OF THE ARSAP.

ON 4 JUNE 1968, HQ CDC PUBLISHED USACDC CIRCULAR NUMBER 11-2 ENTITLED: "USACDC RESPONSIBILITIES TO SUPPORT THE ARMY SMALL ARMS PROGRAM (ARSAP)." AT APPENDIX I TO THIS CIRCULAR HQ CDC ASSIGNED PROPONENCY ACTION FOR THE ARSAP TASKS ASSIGNED CDC TO THE THEN COMBAT ARMS GROUP. COMBAT ARMS GROUP IN TURN ASSIGNED PROPONENCY FOR THESE TASKS, TO INCLUDE ASARS, TO THE INFANTRY AGENCY.

THE PURPOSE OF ASARS IS SHOWN ON THIS NEXT SLIDE:

SLIDE 4 ON

PAUSE

SLIDE 4 OFF

FOR EASE OF MANAGEMENT, THE ASARS PROGRAM WAS SEPARATED INTO TWO PHASES CALLED ASARS I AND ASARS II. THE OBJECTIVE OF ASARS I IS SHOWN ON THIS NEXT SLIDE.

SLIDE 5 ON

PAUSE

ASARS I, AS ITS OBJECTIVE STATED, WAS TO PROVIDE A DATA BASE TO FACILITATE CONTINUED STUDY TO ACCOMPLISH THE ASARS PURPOSE.

SLIDE 5 OFF

ASARS I WAS COMPLETED IN JUNE 1970, AND ARRIVED AT THE FOLLOWING CONCLUSIONS:

SLIDE 6 ON

PAUSE

RECALL MY EARLIER COMMENT ON DATA COLLECTION AND AVAILABILITY. NOTICE THAT IT IS SOMEWHAT MODIFIED BUT NONTHELESS PRESENTED HERE IN THE FIRST CONCLUSION.

TO EXPLAIN SOME TERMS USED IN THESE CONCLUSIONS, LET ME DISCUSS SELECTED ITEMS IN GREATER DETAIL:

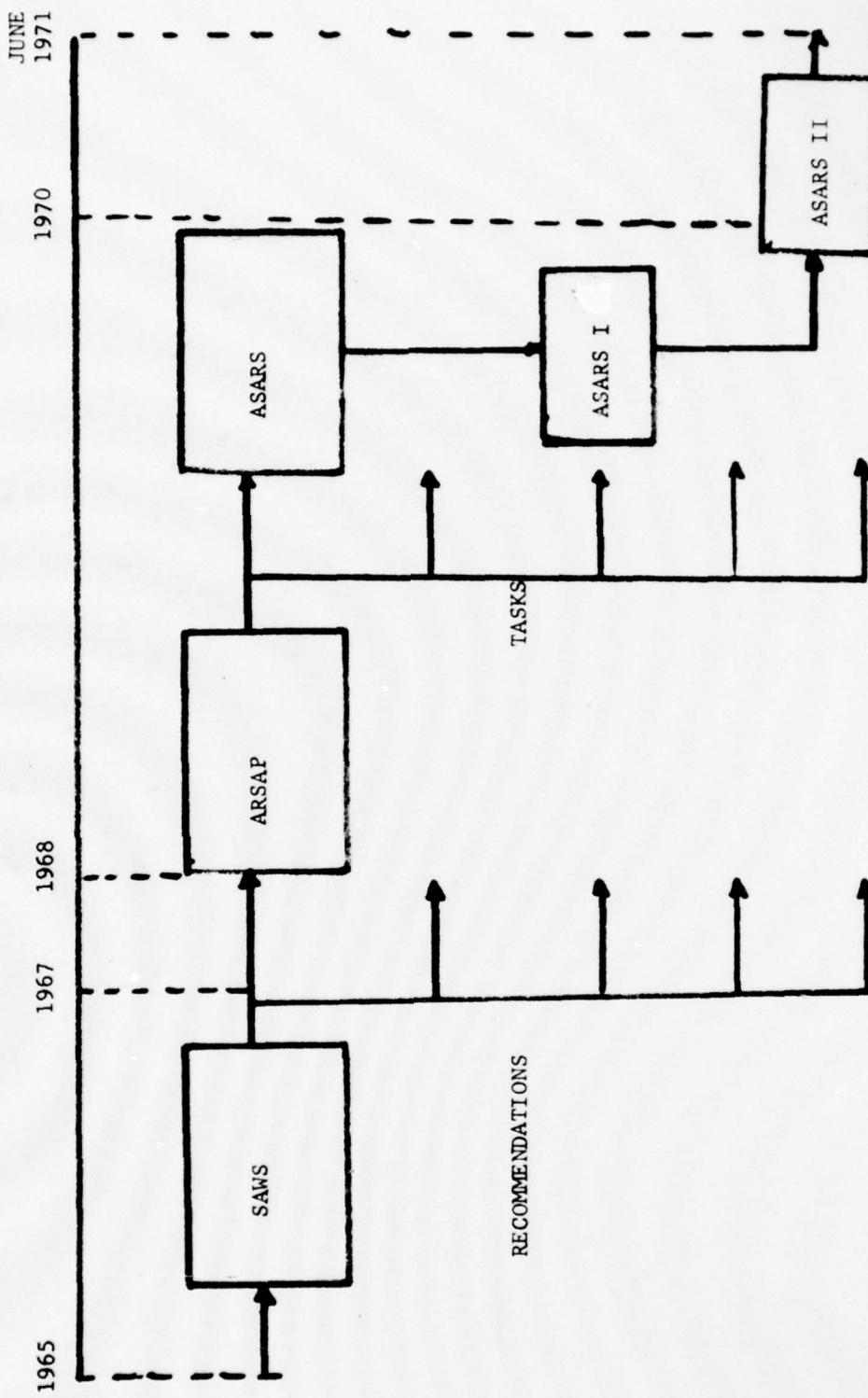
THE COMPOSITE FACTOR - COMPLEX MAP DISCUSSED IN THE SECOND CONCLUSION MAKES REFERENCE TO THE ARMY ENGINEER WATERWAYS STATION AT VICKSBURG, MISSISSIPPI, EFFORT TO REDUCE THE CURRENT MAP SERIES TO COMPUTER LANGUAGE AND STORE THEM ON MAGNETIC TAPES.

REGRESSION ANALYSIS IS A TECHNIQUE OF FITTING MATHEMATICAL FORMULAE TO SOME EXISTING EMPIRICAL DATA. IN THIS CASE, IT IS ENVISIONED THAT THE EMPIRICAL DATA WILL BE CREATED BY THE SIMULATION. AS PRESENTED IN THE GLOSSARY OF YOUR PRE-IPR PACKET IT IS THE ANALYSIS OF THE ASSOCIATION AMONG SEVERAL VARIABLES.

THE LAST TERM WHICH APPEARS TO WARRANT EXPLANATION IS THE ACRONYM OPMOR. OPMOR STANDS FOR OPERATIONS, MATERIEL AND ORGANIZATION. THE REFERENCE WAS INTENDED MORE SPECIFICALLY TO THE "INFANTRY MODULE FOR OPMOR" WHICH WAS TO BE A HIGH RESOLUTION MODEL DEVELOPED WITHIN THE DYNTACS METHODOLOGY. THIS APPROACH HAS SINCE BEEN ABANDONED.

SLIDE 6 OFF

ARE THERE ANY QUESTIONS?



THE ORIGIN OF ASARS

SAWS OBJECTIVES

- I. TO DEVELOP THE NECESSARY ANALYTICAL BACK-GROUND UPON WHICH TO BASE A PROGRAM FOR REPLENISHMENT OF EXISTING STOCKS OF SMALL ARMS.
- II. TO DEVELOP FEASIBLE ALTERNATIVE COURSES OF ACTION.
- III. TO RECOMMEND TO THE CHIEF OF STAFF BY 1 SEPTEMBER 1966 A COURSE OF ACTION.

ARMY SMALL ARMS REQUIREMENTS STUDY  
(ASARS)

PURPOSE

THE PURPOSE OF ASARS IS TO DEVELOP DOCUMENTED DATA PERTAINING TO THE INTERACTION OF VARIABLE SMALL ARMS CHARACTERISTICS, AND THE CAPABILITY, THROUGH SCIENTIFIC METHOD, OF CONDUCTING SUBSEQUENT TRADE-OFFS AMONG THESE CHARACTERISTICS. THE RESULTS OF ASARS, IN CONJUNCTION WITH THE RESULTS OF OTHER ARSAP TASKS, WILL ASSIST IN THE DEVELOPMENT OF THE OPTIMUM SMALL ARMS SYSTEM FOR THE FUTURE.



## ASARS I OBJECTIVE

**TO ESTABLISH A VALID SMALL ARMS REQUIREMENTS  
DATA BASE FOR THE 1980-1985 TIME PERIOD AND CONCURRENTLY  
DEVELOP EFFECTIVENESS MEASURES WHICH WILL PERMIT THE  
DETERMINATION OF THE BEST SMALL ARMS SYSTEMS TO SATISFY  
THESE REQUIREMENTS.**

c-5

Slide 3

c-5

## ASARS I

### CONCLUSIONS

1. ALTHOUGH DATA GAPS REMAIN, SUFFICIENT VALID DATA IS AVAILABLE TO SUPPORT INITIATION OF ASARS II.
2. IF FEASIBLE, USE COMPOSITE FACTOR-COMPLEX MAP FOR ASSIGNMENT OF INDICES.
3. REGRESSION ANALYSIS IS APPROPRIATE ANALYSIS TECHNIQUE FOR ASARS II.
4. COMPUTER SIMULATION IS REQUIRED TO ACCOMPLISH ASARS II.
5. PERFORMANCE CHARACTERISTICS CAN BE RELATED TO COMBAT EFFECTIVENESS THROUGH SIMULATION.
6. DETAILED TRADE-OFFS CANNOT BE MADE, BUT TENTATIVE IDENTIFICATION OF REASONABLE LIMITS ON MOST PERFORMANCE CHARACTERISTICS CAN BE MADE IN ASARS II.
7. THOUGH ONLY MID INTENSITY CAN BE SIMULATED, OPMOR WILL ADEQUATELY SUPPORT ASARS II SIMULATION.

**ASARS II STUDY PLAN**

**INFANTRY AGENCY**

**1015-1045 - 16 JUNE 1971**

WITH THE COMPLETION OF ASARS I THE COURSE WAS NOW SET FOR THE SECOND PHASE - ASARS II. THE OBJECTIVE OF ASARS II IS SHOWN ON THIS NEXT SLIDE:

SLIDE 1 ON

PAUSE

AS YOU CAN SEE, IT IS IN ASARS II THAT THE PURPOSE OF ASARS WILL BE ACCOMPLISHED.

SLIDE 1 OFF

USING ASARS I AS A START POINT, A STUDY DIRECTIVE WAS WRITTEN ON 6 AND 7 OCTOBER 1970. THE STUDY DIRECTIVE WAS PUBLISHED ON 20 OCTOBER 1970. THIS STUDY DIRECTIVE SPECIFIED SIX TASKS TO BE ADDRESSED IN THE STUDY EFFORT. THESE TASKS ARE SHOWN ON THIS NEXT SLIDE.

SLIDE 2 ON

PAUSE

I WOULD LIKE TO DRAW YOU ATTENTION TO TASK #5. THE TWO WORDS YOU SEE AT THE END OF THIS TASK HAVE BEEN ADDED TO CLARIFY THE INTENT OF THIS TASK. WITHOUT THIS ADDITION IT MAY BE INTERPRETED AS INTENDED TO CREATE A NEED WHETHER ONE EXISTS OR NOT. THIS IS NOT THE INTENT, AND THE TWO WORDS HAVE BEEN ADDED TO CLARIFY THIS POINT.

SLIDE 2 OFF

THE INFANTRY AGENCY PREPARED A DRAFT STUDY PLAN, WHICH WAS APPROVED BY HQ CDC ON 6 APRIL 1971 AND ASSIGNED TO THE INFANTRY AGENCY FOR IMPLEMENTATION BY COMS GROUP ON 26 APRIL 1971. THE FINAL STUDY PLAN WAS PUBLISHED ON 3 MAY 1971 AND DISTRIBUTION EFFECTED ON THE SAME SCHEME AS THE ASARS I FINAL REPORT. MY PURPOSE NOW WILL BE TO DISCUSS THE MAJOR ASPECTS OF THIS STUDY PLAN.

THE FIRST OF THESE SIGNIFICANT ASPECTS IS A LIMIT OF THE STUDY WITHIN THE DEFINITION OF SMALL ARMS. FOR PURPOSES OF ASARS, THE ARSAP DEFINITION OF SMALL ARMS WILL BE USED. THIS DEFINITION IS SHOWN ON THIS NEXT SLIDE.

SLIDE 3 ON

IT IS INTERESTING TO NOTE THAT THIS DEFINITION IS CAREFULLY FRAMED SO AS NOT TO PRECLUDE CONSIDERATION OF CONCEPTUAL WEAPONS, SUCH AS LASERS.

SLIDE 3 OFF

TWO ASSUMPTIONS ARE CENTRAL TO THE ASARS PROGRAM AND WILL BE REPEATED HERE TO PLACE THEM IN PERSPECTIVE. THE FIRST IS ON THE ROLE OF THE SMALL ARMS. THE ROLE OF THE SMALL ARMS WILL BE USED AS SPECIFIED IN ANNEX D OF THE ASARS I REPORT AS SHOWN ON THIS SLIDE.

SLIDE 4 ON

PAUSE

SLIDE 4 OFF

THE SECOND ASSUMPTION IS THAT A SIMULATION MODEL CAPABLE OF PRODUCING INFORMATION FROM WHICH MEASUREMENTS CAN BE MADE OF THE DIFFERENCE IN COMBAT EFFECTIVENESS CAUSED BY VARYING WEAPONS PERFORMANCE CHARACTERISTICS WILL BE AVAILABLE NOT LATER THAN 31 MARCH 1972.

FOUR ESSENTIAL ELEMENTS OF ANALYSIS HAVE BEEN DEVELOPED WHICH, AT THIS POINT, APPEAR TO BE ADEQUATE TO PERMIT US TO ADDRESS THE ASARS TASKS. THESE EEA ARE SHOWN ON THIS NEXT SLIDE.

SLIDE 5 ON

PAUSE

SLIDE 5 OFF

RATHER THAN DISCUSS THE METHODOLOGY DEVELOPED SEPARATELY AT THIS POINT, I WOULD LIKE TO INCLUDE ITS DISCUSSION IN THAT OF THE INCLOSURES TO THE STUDY PLAN.

AS DEPICTED ON THIS SIDE VIEWGRAPH SLIDE--

SLIDE 6 ON

PAUSE

THERE ARE NINE INCLOSURES TO THE STUDY PLAN. I WILL DISCUSS EACH OF THESE INCLOSURES VERY BRIEFLY TO PERMIT THEIR ASSOCIATION WITH THE OVERALL PROGRAM.

THE FIRST INCLOSURE IS A TWENTY PAGE BIBLIOGRAPHY FOR USE IN THE STUDY. THE EXISTING BIBLIOGRAPHY IS A SLIGHT MODIFICATION OF THE ONE USED IN ASARS I. A CHANGE IS BEING PREPARED WHICH WILL ADD APPROXIMATELY TEN PAGES OF REFERENCES TO THE EXISTING LISTING.

INCLOSURE TWO IS THE MILESTONE SCHEDULE WHICH PICTORIALLY PORTREYS THE ASARS II METHODOLOGY AND APPEARS ON THIS SLIDE.

SLIDE 7 ON

THE METHODOLOGY AS PRESENTED IN THE ASARS I REPORT WAS USED AS A STARTING POINT AND HAS EVOLVED TO THIS PLAN.

THIS METHODOLOGY ENVISIONS THE LOGICAL PROGRESSION THRU SIX PHASES TOWARD COMPLETION OF THE STUDY IN JUNE 1973.

PHASE I - THE INITIAL DEVELOPMENT PLAN - IS ENDED WITH THIS IPR AND CONSTITUTES THE BEGINNING OF THE ASARS II EFFORT.

PHASE II IS DEVOTED TO THE MAXIMUM WORK EFFORT AT DEVELOPMENT OF ALL SUPPORTING ACTIONS RELATED TO THE SUBTASKS OF ASARS II. THIS IS A LONG PHASE AND WILL TERMINATE IN MAY 1972. THE BREAK POINT AT 15 DECEMBER 1971 IS A TENTATIVE IPR DATE.

PHASE III WILL PERMIT THE EXERCISE OF THE SIMULATION AND RUNNING OF NECESSARY FIELD TESTS TO PERMIT FUTURE EVALUATION OF THIS SOFTWARE. IT WILL TERMINATE CIRCA SEPTEMBER 1972.

PHASE IV IS DEVOTED TO COMPLETION OF ALL NECESSARY ACTIONS TO PERMIT AN EVALUATION OF THE COMPUTER CONTRIBUTION TO ASARS II AND COMPLETION OF RELATED JUDGMENTAL STUDIES. THIS PHASE TERMINATES ON 7 NOVEMBER 1972.

PHASE V WILL BE INITIATED ABOUT 7 NOVEMBER UPON COMPLETION OF THE MODELING EFFORT AND WILL INTEGRATE THE ACTIONS OF FULL SCALE COMPUTER RUNS.

PHASE VI, THE FINAL PHASE, WILL ENCOMPASS THE FINAL PREPARATION OF THE ASARS II REPORT.

I ASK THAT WE AVOID ANY DETAILED DISCUSSION OF THE INTERNAL INFORMATION ON THIS SLIDE IN DEFERENCE TO A MORE DETAILED PRESENTATION OF A MANAGEMENT PROGRAM LATER WHICH WILL PROBABLY ANSWER MANY QUESTIONS.

WHAT I WOULD LIKE TO GET ACROSS FROM THIS SLIDE IS THE PHASING WHICH HAS JUST BEEN DISCUSSED AND THE SCHEDULING OF IPRS.

MAY I DIRECT YOUR ATTENTION TO THE BOTTOM LINE OF DATES ON THIS VIEWGRAPH. THESE DATES CORRESPOND TO SIX PLANNED IPRS, OF WHICH THIS IS THE FIRST. THESE TENTATIVE IPR DATES ARE KEYED TO THE PHASES DISCUSSED EARLIER AND PROGRAMMED AT CRITICAL DECISION POINTS IN THE PROGRAM.

I WOULD LIKE TO COMPLETE THIS DISCUSSION OF THE METHODOLOGY AT THIS TIME, UNLESS THERE ARE QUESTIONS.

PAUSE

SLIDE 7 OFF

INCLOSURE THREE CONTAINS A DETAILED DISCUSSION OF THE PROGRAM OF WORK AND CONCEPT OF EXECUTION FOR THE MODEL CONSTRUCTION BY SYSTEMS ANALYSIS GROUP. THIS INCLOSURE ADDRESSES ALSO THE PROVISION OF OPERATIONS RESEARCH/SYSTEMS ANALYSIS SUPPORT TO THE INFANTRY AGENCY BY SYSTEMS ANALYSIS GROUP. THIS SUBJECT AREA WILL BE DISCUSSED IN GREATER DETAIL THIS AFTERNOON.

INCLOSURE FOUR IS A DECEPTIVELY SIMPLE PRESENTATION OF A VERY BUSY ACTIVITY. PRIOR TO DISCUSSING THIS INCLOSURE IT IS NECESSARY TO BRIEFLY ADDRESS THE SUBJECT OF JUDGMENTAL OR NON-SIMULATION STUDIES. ANNEX K TO ASARS I PRESENTS TWELVE OF THESE RELATED STUDIES FOR PREPARATION.

SLIDE 6 OFF  
SLIDE 8 ON

THE PURPOSE OF INCLOSURE FOUR IS TO RELATE THESE JUDGMENTAL STUDIES TO THE ASARS II TASKS AND DESIGNATE THOSE AGENCIES RESPONSIBLE FOR AND CONTRIBUTING TO THEIR SATISFACTION. I ASK THAT YOU ALL BEAR WITH ME AS I TRY TO PORTRAY THIS INCLOSURE.

I AM NOW HANDING OUT A COPY OF A SLIDE PRESENTED EARLIER OF THE ASARS II TASKS NUMBERED ONE THROUGH SIX.

TO FURTHER CONFUSE THE ISSUE I AM PLACING ON THE MAIN VIEWGRAPH AN OUTLINE OF INCLOSURE FOUR.

SLIDE 9 ON

I WILL NOW EXPLAIN HOW THIS INCLOSURE IS INTENDED TO FUNCTION. THE LEFT COLUMN LISTS THOSE TASKS ASSIGNED TO ASARS II. THE NUMBERS ON THE SLIDE CORRESPOND TO THE NUMBERS OF THE TASKS ON THE COPY OF THE EARLIER SLIDE YOU HAVE BEEN HANDED. THE SECOND COLUMN LISTS THOSE RELATED STUDIES WHICH ARE DIRECTLY ASSOCIATED TO SPECIFIC ASARS II TASKS. THE NUMBERS IN THIS COLUMN CORRESPOND TO SPECIFIC RELATED STUDIES DEPICTED ON THE SIDE VIEWGRAPH. THE REMAINING COLUMNS OF THIS SLIDE LIST THOSE CDC AND NON-CDC AGENCIES PARTICIPATING IN THE ASARS STUDY EFFORT THAT HAVE BEEN IDENTIFIED TO DATE. ONE AGENCY NEEDS TO BE ADDED AT THIS TIME AND THAT IS THE MAINTENANCE AGENCY. THE "X" UNDER A SPECIFIC AGENCY CORRESPONDING TO SOME TASK OR RELATED STUDY INDICATES APPLICABILITY TO THAT EFFORT. THE DOUBLE ASTERISK REFLECTS COORDINATION ONLY. THE TRIPLE ASTERISK INDICATES ON-GOING STUDY EFFORT AND THOSE "X'S" WITH FOUR ASTERISKS, THOSE AGENCIES WHICH HAVE PROPONENCY FOR THE EFFORT, IF OTHER THAN THE INFANTRY AGENCY.

LET ME PROCEED THROUGH AN EXAMPLE TO CLARIFY THIS INCLOSURE.

FOR THIS PURPOSE WE WILL USE TASK #5 WITH RELATED STUDY #7 (NON-INFANTRY APPLICATIONS). THE "X'S" INDICATE THAT THE EFFORT IS APPLICABLE TO THE AGENCIES INDICATED AND FURTHER THE LACK OF THE FOUR ASTERISKS INDICATES PROPONENCY FOR THE EFFORT IS RETAINED BY THE INFANTRY AGENCY. THIS PARTICULAR EFFORT WILL BE DISCUSSED IN GREATER DETAIL TOMORROW.

ARE THERE ANY QUESTIONS?

SLIDE 8 OFF

SLIDE 9 OFF

SLIDE 6 ON

INCLOSURE FIVE IS AN EXPERIMENTATION DIRECTIVE TO CDCEC WHICH IS TO SERVE AS A "WARNING ORDER" OF THE REQUIREMENT TO CONDUCT FIELD EXPERIMENTATION TO SERVE AS A BASIS FOR ANALYSIS OF THE SIMULATION UNDER DEVELOPMENT. THE PURPOSE AND ASSOCIATION OF THIS EXPERIMENT WILL BE EXPLAINED IN THE MANAGEMENT PROGRAM.

INCLOSURE SIX IS A PROGRAM OF MANPOWER EXPENDITURE BY THE INFANTRY AGENCY OF INFANTRY AGENCY ASSETS.

INCLOSURES SEVEN AND EIGHT ESTABLISH THE FORMATS FOR THE SUPPORTING STUDIES AND THE FINAL REPORT, RESPECTIVELY.

AT INCLOSURE NINE ARE THE DOCUMENTS INITIATING THE ASARS II STUDY.

SLIDE 6 OFF

THIS CONCLUDES THIS PORTION OF THE PRESENTATION. ARE THERE ANY QUESTIONS?

ASARS II OBJECTIVE

TO DETERMINE AND DOCUMENT THOSE VARIABLE AND INTERACTING CHARACTERISTICS NEEDED TO SATISFY FUTURE SMALL ARMS REQUIREMENTS AND IDENTIFY THE RELATIVE IMPORTANCE OF THESE CHARACTERISTICS IN TERMS OF COMBAT EFFECTIVENESS. THE RESULTS OF THIS STUDY WILL BE USED TO SUPPORT THE PREPARATION OF MATERIEL NEED DOCUMENTS FOR SMALL ARMS.

D-1

## ASARS II TASKS

1. UPDATE, MODIFY AND EXPAND THE DATA BASE IN ASARS I AND MONITOR DATA FROM OTHER ARSAP TASKS AS MAY BE NECESSARY TO ACCOMPLISH ASARS II.
2. EXERCISE A HIGH RESOLUTION COMPUTER SIMULATION IN ACCOMPLISHING THE OBJECTIVES OF ASARS II.
3. DETERMINE THE ROLE AND EFFECTIVENESS OF SMALL ARMS AS THEY RELATE TO INFANTRY BATTALION SUPPORTING WEAPONS IN COMBAT.
4. DETERMINE THE RELATIVE CONTRIBUTION OF VARIOUS SMALL ARMS WEAPONS PERFORMANCE CHARACTERISTICS TO OVERALL COMBAT EFFECTIVENESS FOR EACH CONFLICT INTENSITY IN ATTACK, DEFENSE, AND MEETING ENGAGEMENT.
5. IDENTIFY THE NEED FOR IMPROVED WEAPONS TO ACCOMPLISH THE SMALL ARMS MISSION WHICH CAN BE USED TO SUPPORT THE PREPARATION OF MATERIEL NEED DOCUMENTS FOR SMALL ARMS WHERE NECESSARY.
6. FROM RESULTS OF ANALYSIS CONDUCTED, DETERMINE AND DOCUMENT THOSE VARIABLE WEAPONS PERFORMANCE CHARACTERISTICS CONSIDERED ESSENTIAL TO SATISFY FUTURE SMALL ARMS REQUIREMENTS.

SMALL ARMS SYSTEM

A FAMILY OF HAND CARRIED WEAPONS, INCLUDING AUTOMATIC WEAPONS, GENERALLY .60 CALIBER OR LESS, DESIGNED TO DELIVER IN EITHER A MOUNTED OR DISMOUNTED MODE, ACCURATE AND DISCRIMINATORY FIRE AGAINST ENEMY TARGETS (STATIONARY OR MOVING) EITHER INDEPENDENTLY OR IN CONJUNCTION WITH SUPPORTING WEAPONS. (THIS DEFINITION INCLUDES HAND HELD AREA BURST TYPE WEAPONS SUCH AS THE M79 GRENADE LAUNCHER).

ASARS

ROLE OF SMALL ARMS

1. TO PROVIDE GROUND FORCES WITH FIREPOWER FOR CLOSING WITH THE ENEMY IN ORDER TO DESTROY HIM OR HIS WILL TO FIGHT, OR TO REPEL HIS ASSAULT BY FIRE, CLOSE COMBAT AND COUNTERATTACK.
2. TO PROVIDE A WEAPON FOR THE INDIVIDUAL(S) RESPONSIBLE FOR SECURITY OF MAN OR MATERIEL, IN PEACE OR WAR, AND IN THE COMBAT ZONE OR THE NONCOMBAT ZONE.
3. TO PROVIDE PROTECTION FOR THE INDIVIDUAL(S) IN NONSECURE AREAS.

0-5

ESSENTIAL ELEMENTS OF ANALYSIS (EEA)

1. WHAT ARE THE PERFORMANCE CHARACTERISTICS OF SMALL ARMS WHICH AFFECT COMBAT EFFECTIVENESS?
2. DETERMINE THE ROLE AND EFFECTIVENESS OF SMALL ARMS AS RELATED TO INFANTRY BATTALION SUPPORTING WEAPONS IN COMBAT.
3. WHAT ARE THE VARIABLE WEAPONS PERFORMANCE CHARACTERISTICS CONSIDERED ESSENTIAL TO SATISFY FUTURE SMALL ARMS REQUIREMENTS?
4. WHAT IS THE RELATIVE CONTRIBUTION OF VARIABLE WEAPONS PERFORMANCE CHARACTERISTICS TO COMBAT EFFECTIVENESS?

105

INCLOSURES TO ASARS II STUDY PLAN

1. REFERENCES
2. MILESTONES
3. SAG SUPPORT
4. TASKING CHARTS
5. EXPERIMENTATION DIRECTIVE
6. MAN-HOUR PROGRAM
7. FORMAT FOR SUPPORTING REPORTS
8. FORMAT FOR ASARS II FINAL REPORT
9. TASKING DIRECTIVE

ASARS II METHODOLOGY AND MILESTONES

1970 N D J F M A M J J A S O N D J F M A M J J A S O N D J F M A M 1972

1973

1971

1972

1973

1974

1975

1976

1977

1978

1979

1980

1981

1982

1983

1984

1985

1986

1987

1988

1989

1990

1991

1992

1993

1994

1995

1996

1997

1998

1999

2000

2001

2002

2003

2004

2005

2006

2007

2008

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

2026

2027

2028

2029

2030

2031

2032

2033

2034

2035

2036

2037

2038

2039

2040

2041

2042

2043

2044

2045

2046

2047

2048

2049

2050

2051

2052

2053

2054

2055

2056

2057

2058

2059

2060

2061

2062

2063

2064

2065

2066

2067

2068

2069

2070

2071

2072

2073

2074

2075

2076

2077

2078

2079

2080

2081

2082

2083

2084

2085

2086

2087

2088

2089

2090

2091

2092

2093

2094

2095

2096

2097

2098

2099

2000

2001

2002

2003

2004

2005

2006

2007

2008

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

2026

2027

2028

2029

2030

2031

2032

2033

2034

2035

2036

2037

2038

2039

2040

2041

2042

2043

2044

2045

2046

2047

2048

2049

2050

2051

2052

2053

2054

2055

2056

2057

2058

2059

2060

2061

2062

2063

2064

2065

2066

2067

2068

2069

2070

2071

2072

2073

2074

2075

2076

2077

2078

2079

2080

2081

2082

2083

2084

2085

2086

2087

2088

2089

2090

2091

2092

2093

2094

2095

2096

2097

2098

2099

2000

2001

2002

2003

2004

2005

2006

2007

2008

2009

2010

2011

2012

2013

2014

2015

2016

2017

2018

2019

2020

2021

2022

2023

2024

2025

2026

2027

2028

2029

2030

2031

2032

2033

2034

2035

2036

2037

2038

2039

2040

2041

2042

2043

2044

2045

2046

2047

2048

2049

2050

2051

2052

2053

2054

2055

2056

2057

2058

2059

2060

2061

2062

2063

2064

2065

ASARS II RELATED STUDIES

1. ROLE AND EFFECTIVENESS OF SMALL ARMS RELATED TO INFANTRY BATTALION SUPPORTING WEAPONS.
2. PENETRATION OF MATERIEL.
3. SUSTAINABILITY.
4. VULNERABILITY FACTORS.
5. TARGET ACQUISITION AND SUPPRESSION.
6.  $P_{h1}, P_{h2}$ , TACTICAL ROF (DEVELOPMENT OF EMPIRICAL DATA).
7. NON-INFANTRY APPLICATIONS.
8. WEAPON WEIGHT, TRANSPORT AND STORAGE.
9. RELIABILITY/MAINTAINABILITY.
10. DURABILITY.
11. WEAPON CONTROL, MANNING, BOI.
12. COST/TRAINING.

## TASK ASSIGNMENT

ASARS II TASKS	RELATED STUDIES	USACDC						NON-CDC					
		CSYGIN	CDGCSAG	CDGRC	CSYGAJ	CSYGF4	CSYGAJ	CSYQPA	CONARC	AMC	AMSA	EURSRO HEL	
1.		X											
2.		X**	X***	X									
3.	1.	X				X**	X**	X**					
4.	2.		X**	X**					X				
	3.	X	X							X	X		
	4.	X						X					
	5.	X	X**	X					X				
	6.	X	X**						X	X***			
	7.	X			X	X	X	X					
	8.		X	X	X	X	X	X	X	X**	X**		
	9.	X		X						X			
	10.	X									X***		
	11.	X	X	X	X	X	X	X	X				
	12.										X***	X***	

D-9

ASARS II PROGRAM CONTROL

INFANTRY AGENCY

1045-1105 - 16 JUNE 1971

ANY STUDY, THE MAGNITUDE OF ASARS, CONSTITUTES A CHALLENGE TO MANAGEMENT. TO FACILITATE MANAGEMENT OF THE STUDY THE INFANTRY AGENCY HAS DEVELOPED TWO MANAGEMENT PROGRAMS WHICH I WILL PRESENT. THE FIRST IS THE OVERALL ASARS MANAGEMENT PROGRAM AND THE SECOND IS THE ASARS II INPUT DATA COLLECTION PLAN, WHICH WILL BE DISCUSSED LATER.

THE GOAL OF BOTH OF THESE PLANS IS TO APPLY THE PROGRAM EVALUATION AND REVIEW TECHNIQUE (PERT) TO THE MANAGEMENT OF THE ASARS EFFORT. THIS WILL PERMIT US TO IDENTIFY THOSE CRITICAL ASPECTS OF THE PROGRAM, IDENTIFY THE INTERACTION AND IN SOME CASES INTERDEPENDENCIES OF THESE ASPECTS, ASSOCIATE THEIR RELATIONSHIP WITH TIME AND PERMIT US TO APPLY THE PRINCIPLE OF MANAGEMENT BY EXCEPTION.

THE PLAN IS BASED ON THE DEFINITION OF MANAGEMENT BY EXCEPTION, AS DEFINED ON THIS SLIDE.

SLIDE 1 ON

THIS SLIDE PRESENTS A DEFINITION OF THE TERM.

SLIDE 1 OFF

WITH THIS GOAL IN MIND THE PLAN YOU SEE DEPICTED ON THE CHART TO YOUR FRONT WAS DEVELOPED. COPIES OF THIS CHART ARE BEING HANDED OUT AT THIS TIME.

THIS CHART CAN BE CALLED ANYTHING FROM A GANTT OR PERT CHART TO A TACMAP. WE HAVE ELECTED TO CALL IT A PROGRAM MANAGEMENT PLAN.

THE VARIOUS LINES CONNECTING EFFORTS HAVE SIGNIFICANCE AND I WOULD LIKE TO EXPLAIN THEM AT THIS TIME. TO ACCOMPLISH THIS I WILL USE A COLORED EXAMPLE EXTRACTED FROM THE ASARS INPUT DATA COLLECTION PLAN, WHICH WILL BE EXPLAINED LATER; HOWEVER, THE SYMBOLS USED ARE CONSISTENT IN BOTH PLANS.

SLIDE 2 ON

SLIDE 3 ON

THE RED OR DOTTED LINE SERVES TO INDICATE DEPENDENCY OF ONE ACTION ON ANOTHER. THE BLUE OR SHADED LINE REPRESENTS JOINT EFFORTS BY TWO OR MORE AGENCIES. THE THIRD SYMBOL USED IS THE BROKEN SOLID OR BLACK LINE, WHICH REPRESENTS THE SOMEWHAT LESS CRITICAL INTERDEPENDENCIES BUT LOGICAL PROGRESSION OF EVENTS. THE FOURTH SYMBOL USED IS THE NON-UNIFORMLY CROSS BROKEN BLACK LINE OR THE GREEN LINE, WHICH REPRESENTS INPUTS ALREADY UNDER DEVELOPMENT. THE FIFTH AND LAST SYMBOL IS THE UNIFORMLY CROSS BROKEN OR ORANGE LINE WHICH DEPICTS WHAT HAS NOW JUDGMENTALLY BEEN DESIGNATED AS THE CRITICAL PATH.

SLIDE 2 OFF

I WILL LEAVE THIS KEY SLIDE ON FOR THE DURATION OF THE PRESENTATION FOR YOUR CONVENIENCE.

I ASK THAT YOU RECOGNIZE AT THIS POINT AND THROUGHOUT THIS PRESENTATION THAT IN THE STRICT SENSE OF THE WORD THIS IS NOT A PERT ANALYSIS. WHAT REMAINS TO BE DONE TO FIT THIS DEFINITION IS THE ASSIGNMENT OF THE MANHOUR AND RESULTANT TIME SPAN REQUIRED FOR EACH OF THE ACTIONS ON THE CHART TO PERMIT A MATHEMATICAL RELATION BETWEEN THE BEGINNING AND END OF THE PROGRAM TO BE DRAWN AND THROUGH THE USE OF COMPUTER PROGRAMS THE DEVELOPMENT MONITORED AND THE CRITICAL PATH ANALYZED.

I WILL NOW DISCUSS EACH ELEMENT ON THIS CHART AND ITS RELATIONSHIP TO THE PROGRAM.

#### DISCUSSION

GENTLEMEN, THIS CONCLUDES THIS PORTION OF THE PRESENTATION. ARE THERE ANY QUESTIONS?

MANAGEMENT BY EXCEPTION

VARIANCE FROM STANDARDS WHEREBY A COMMANDER OR

STAFF CAN QUICKLY IDENTIFY PROBLEM AREAS THAT NEED

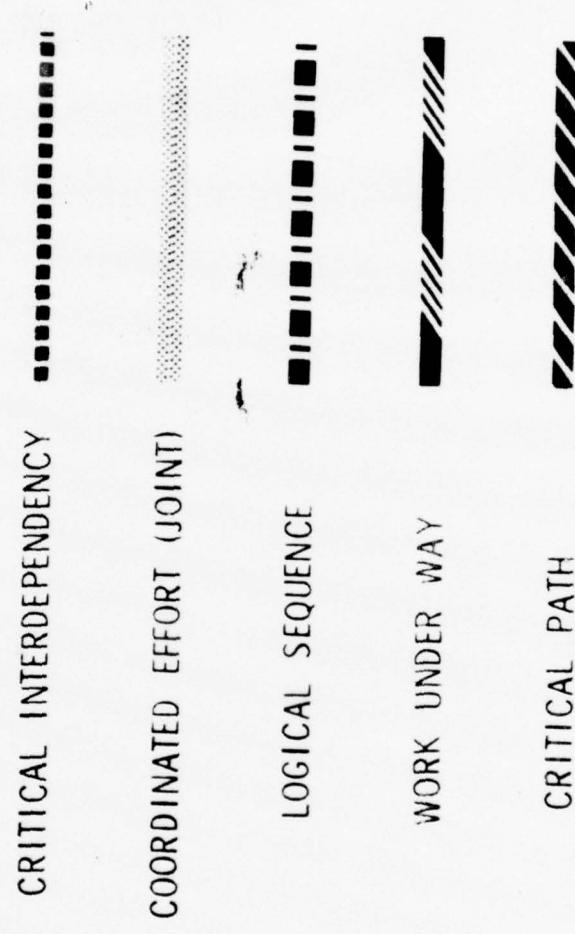
ATTENTION AND TAKE APPROPRIATE ACTION

RE: MAPTOE

MANAGEMENT PRACTICES FOR TOE UNITS

# ASARS II INPUT DATA COLLECTION PLAN

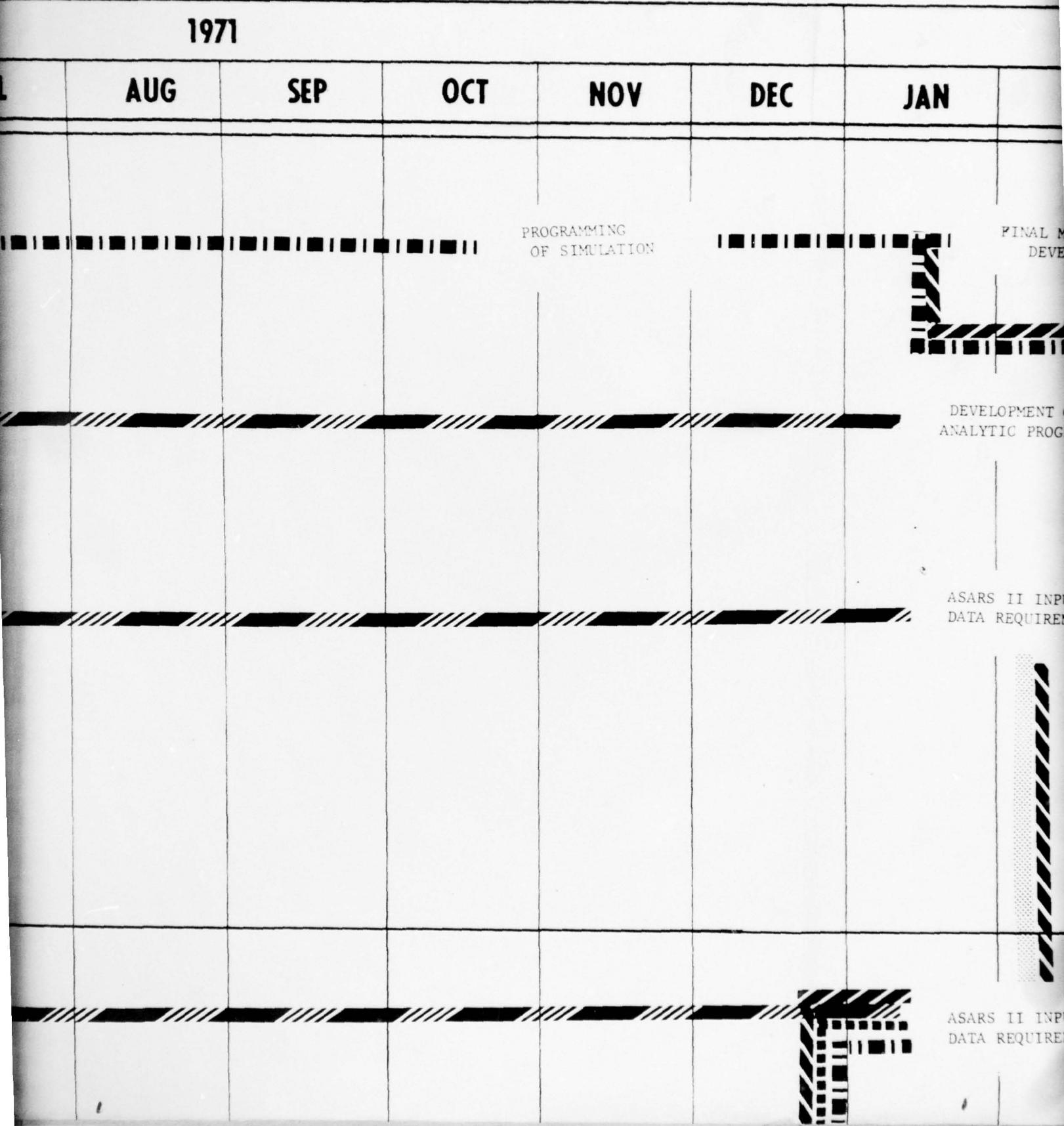
YEAR	1971	MONTH	MARCH	YEAR	1972	MONTH	MARCH
RESPONSIBLE AGENCY	INF AGENCY	RESPONSIBLE AGENCY	INF AGENCY	SCOPE	LEVEL OF CONFLICT GEOGRAPHICAL AREA COMBAT OPERATIONS	SCOPE	LITTON CONT. TO USASASA ON SUPPRESSION
ORGANIZATION		ORGANIZATION		AREA OF OP.	OBSTACLES	ORGANIZATION	
SCENARIO		SCENARIO		DOCT. & TACT.	FIRE SPT	SCENARIO	
PARAMETRIC IN.		PARAMETRIC IN.		OUTPUT REQUIRE.		PARAMETRIC IN.	
ANALYSIS		ANALYSIS		ANALYSIS		ANALYSIS	
TSIA		TSIA		TSIA		TSIA	
SCOPE		SCOPE		SCOPE		SCOPE	
ORGANIZATION		ORGANIZATION		ORGANIZATION		ORGANIZATION	
AREA OF OP.		AREA OF OP.		AREA OF OP.		AREA OF OP.	
SCENARIO		SCENARIO		SCENARIO		SCENARIO	
DOCT. & TACT.		DOCT. & TACT.		DOCT. & TACT.		DOCT. & TACT.	
PARAMETRIC IN.		PARAMETRIC IN.		PARAMETRIC IN.		PARAMETRIC IN.	
OUTPUT REQUIRE.		OUTPUT REQUIRE.		OUTPUT REQUIRE.		OUTPUT REQUIRE.	
ANALYSIS		ANALYSIS		ANALYSIS		ANALYSIS	
SOURCE AGENCIES OTHER THAN TA OR TSIA		USASASA		SOURCE AGENCIES OTHER THAN TA OR TSIA		USASASA	





2 ASARS

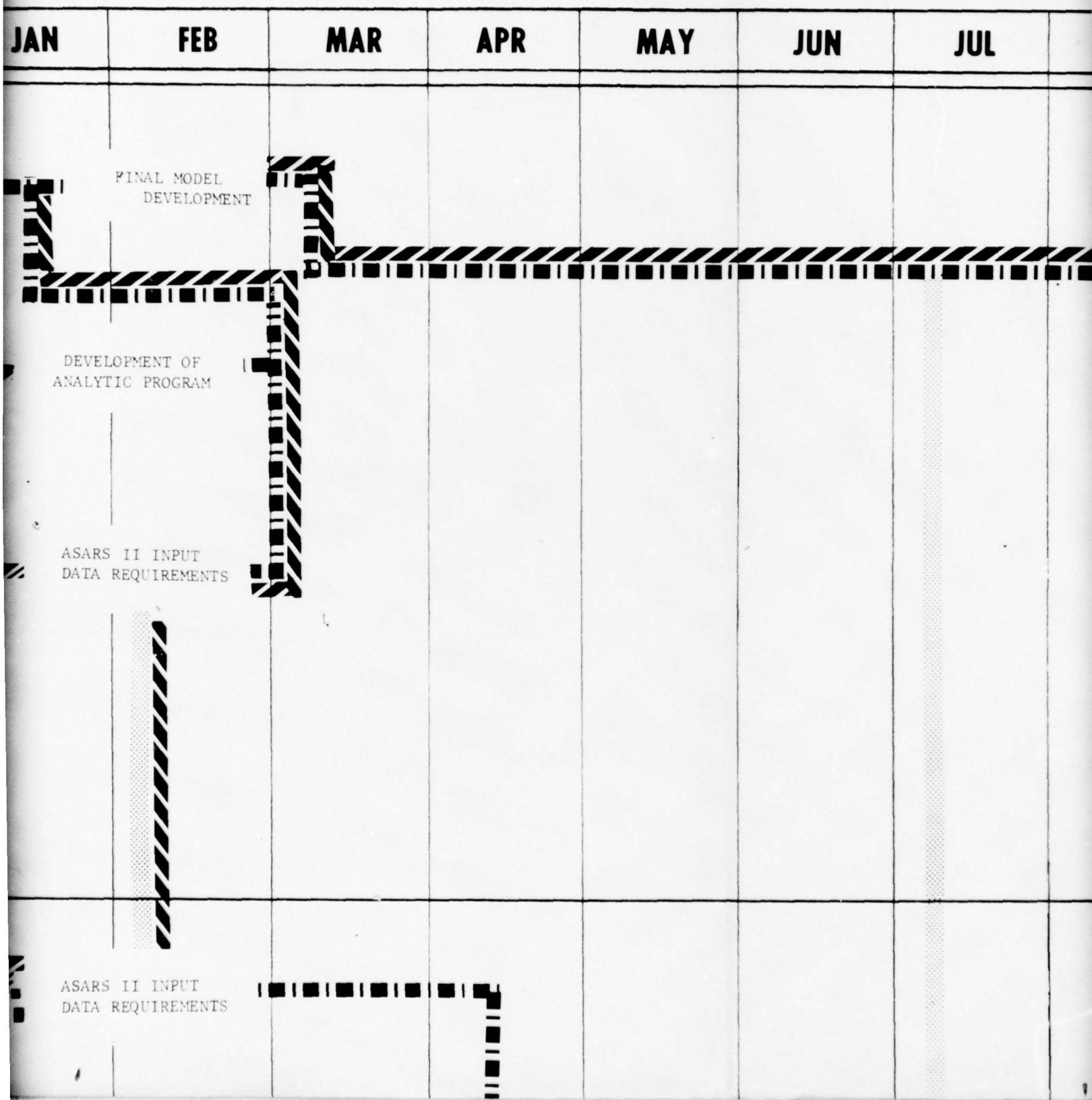
1971



# 2 ASARS II PROGRAM MANAGEMENT PLAN

3

1972



3

4

4

1973

51

FEB

MAR

APR

MAY

JUN

6  
**IA**  
**(PROPOSER)**

|||||

**CDCEC**

|||||

|||||

SUPPRESSI  
EXPERIMEN

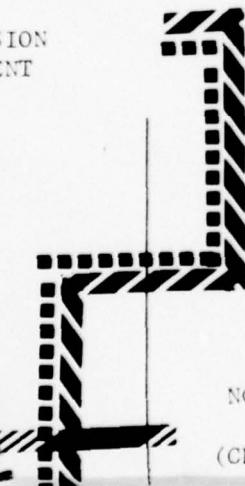
**OTHERS**

COMS GROUP  
AGENCIES

|||||

MONITOR DEVELOPMENT  
OF JUDGMENTAL STUDIES  
BEING ACCOMPLISHED  
OUTSIDE OF INF AGEN

UPPRESSION  
KPERIMENT



NON INFANTRY APPLICATIONS  
OF SMALL ARMS  
(CDCAR, CDCFA, CDCAV, CDCEA,  
CDCMPA, CDCADA)



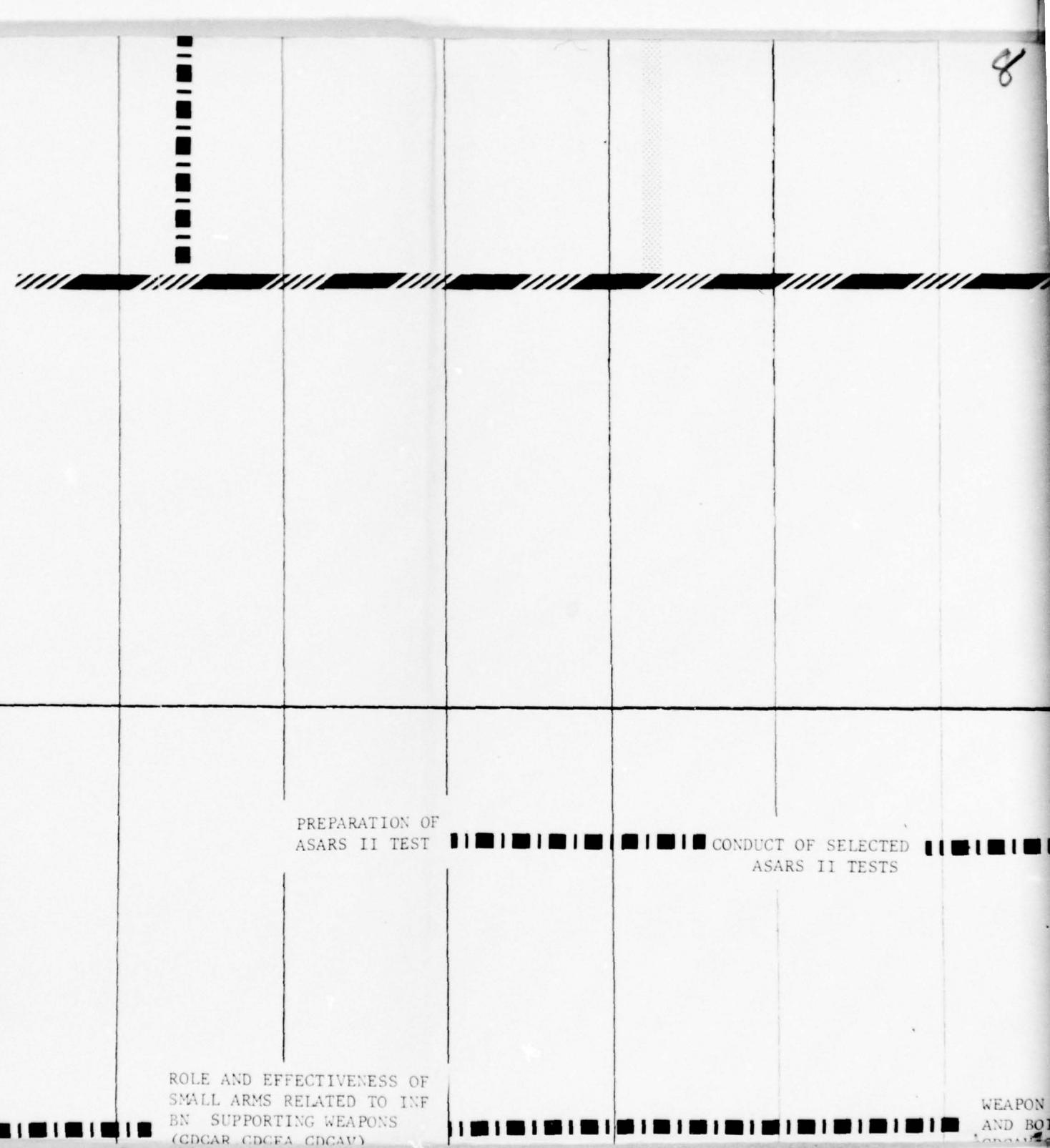
TEVAD

REFORM



WEAPON WEIGHT, TRANSPORT  
AND STORAGE (CDCAR, CDCFA,  
CDCAV, CDCEA, CDCMPA, CDCADA)

7  
PMENT  
STUDIES  
SHED  
AGENCY



8

DRAFT FINAL  
REPORT

9

PREPARATION OF  
FINAL REPORT

CORRELATION OF  
JUDGMENTAL  
STUDIES

CORRELATION OF DATA  
AND PREPARATION OF  
FINAL REPORT OF TEST

EAPON CONTROL, MANNING  
ND BOI (CDCAR, CDCFA,  
and other agencies)

9  
RATION OF  
L REPORT

COORDINATION  
OF FINAL  
REPORT

10

CONARC

HUMRRO

TARGET DETECTION  
AND RANGE EST-  
IMATION

AMC

AMSAA

USASASA

HEL

**PHASES**

I

**IPRS**

**16-17 JUN #1**

TARGET  
ACQUISITION

VULNERABILITY  
FACTORS

VULNERABILITY  
FACTORS

$P_h$ ,  $P_k$ , Tactical  
ROF, EMPIRICAL  
DATA

SUPPRESSION

WEAPON WEIGHT,  
TRANSPORT AND  
STORAGE

II

15 DEC #2

ODGAV, ODGEA, ODGIFA, ODE

COST/TRAIN

PEN

PEN

III

IV

1 JUN #3

5 SEP #4

7 NO

GUARANÍ

## RAINING

## PENETRATION OF MATERIEL

## PENETRATION OF MATERIEL

V

VI

NOV #5

6 FEB #6

1 MAY #7 11



ASARS II INPUT DATA

COLLECTION PLAN

INFANTRY AGENCY

1105-1125 - 16 June 1971

TO SERVE AS A LEAD INTO THIS AFTERNOON'S PRESENTATION OF THE ASARS SIMULATION UNDER DEVELOPMENT, I WILL NEXT PRESENT THE INFANTRY AGENCY'S ASARS II INPUT DATA COLLECTION PLAN, WHICH IS THE SECOND OF OUR MANAGEMENT PROGRAMS.

ONCE AGAIN I WILL LEAVE THE KEY SLIDE ON FOR YOUR REFERENCE.

MANY RELATED STUDIES WILL HAVE TO BE COMPLETED TO SATISFY THE ASARS OBJECTIVES AND, IN FACT, TO SATISFY INPUT REQUIREMENTS OF THE SIMULATION ITSELF. TO FACILITATE INITIATION, CONTROL AND COMPLETION OF THESE STUDIES OR EFFORTS, AN ASARS II INPUT DATA COLLECTION PLAN HAS BEEN DEVELOPED. THE CHART TO YOUR FRONT, AND BEING DISTRIBUTED, HAS BEEN DEVELOPED TO SATISFY THIS REQUIRED CONTROL.

THE LEFT OR VERTICAL AXIS OF THIS CHART LISTS THE EIGHT GENERAL AREAS OF INPUT DATA, EITHER INA OR SAG AS RESPONSIBLE AGENCIES FOR THEIR COLLECTION AND OTHER AGENCIES CONTRIBUTING SPECIFIC ELEMENTS OF DATA FOR INPUT. THE HORIZONTAL AXIS ACROSS THE TOP PERMITS US TO ASSOCIATE TIME WITH OUR COLLECTION EFFORT. AS YOU WILL NOTICE, 31 MARCH IS ESTABLISHED AS THE CUT-OFF DATE FOR ALL INPUTS AS THIS IS THE BEGINNING OF THE TRIAL RUNS PROGRAMMED IN THE OVERALL METHODOLOGY.

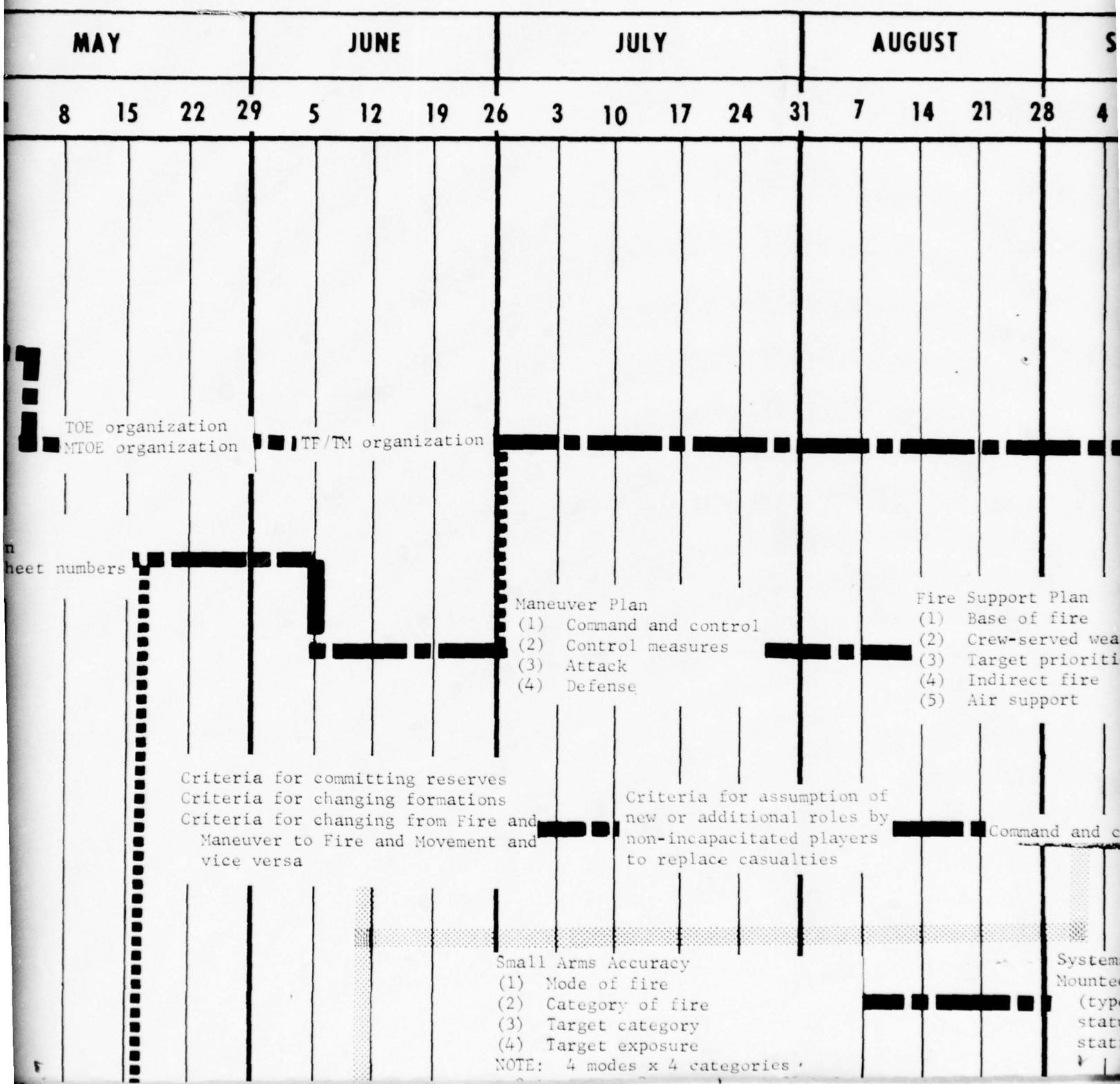
I WILL NOW DISCUSS THE INTERNAL ELEMENTS OF THIS PROGRAM.

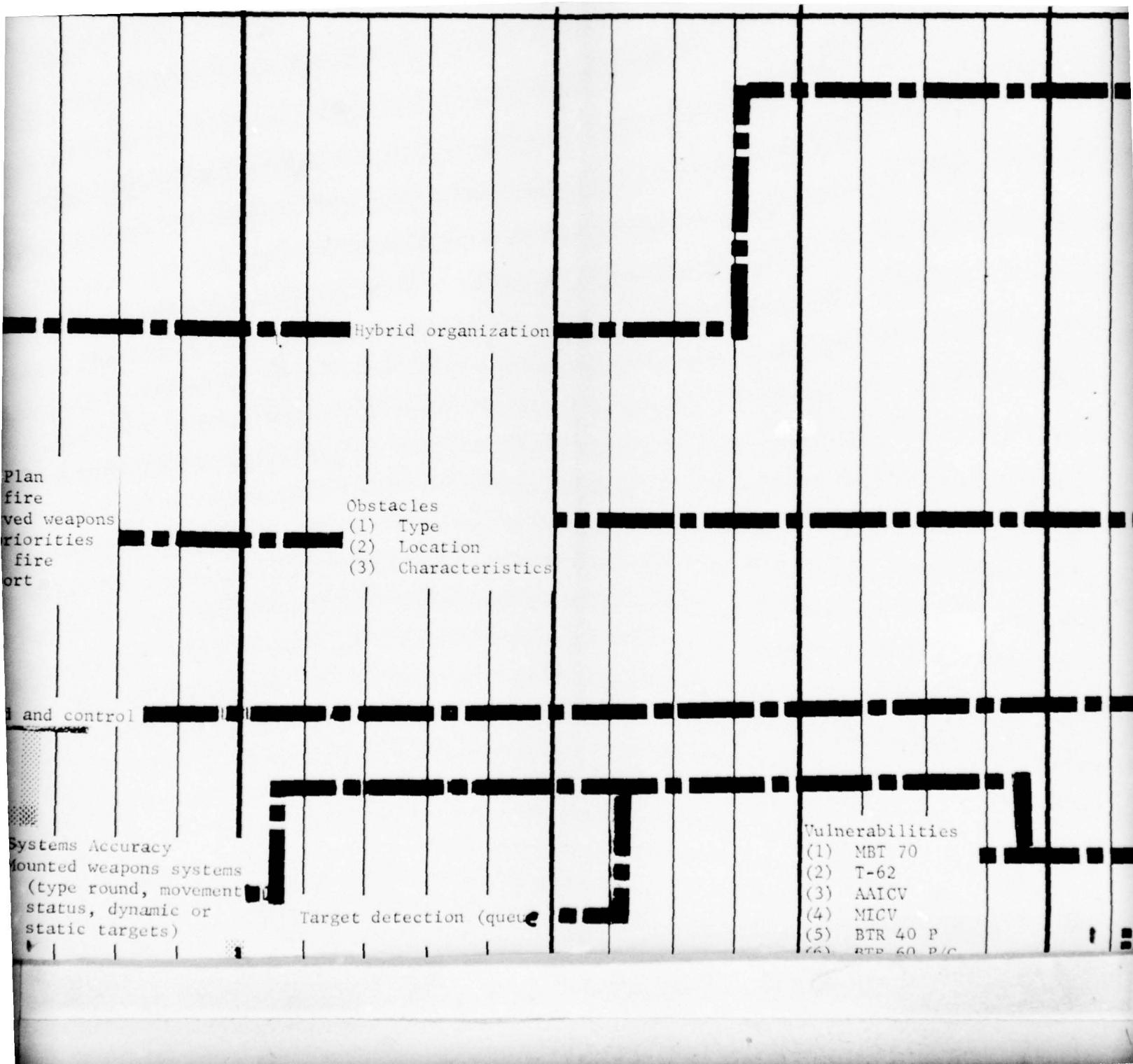
#### DISCUSSION

THIS CONCLUDES THE PRESENTATION, AND I WOULD NOW LIKE TO OPEN THE FLOOR TO QUESTIONS AND/OR DISCUSSION ON THE MORNING'S PRESENTATION.

YEAR				
MONTH	MARCH		APRIL	
WEEK (CLOSE DATE)	6	13	20	27
<b>RESPONSIBLE AGENCY</b>				
IA				
<b>SCOPE</b>			Level of conflict Geographical area of combat Combat operations	
<b>ORGANIZATION</b>				
<b>AREA OF OPERATION</b>				 Season Map Sheet
<b>SCENARIO</b>				
<b>DOCTRINE AND TACTICS</b>				
<b>PARAMETRIC INPUTS</b>				
<b>OUTPUT REQUIREMENTS</b>				

1971





3  
4  
1972

JANUARY

FEBRUARY

MARCH

25 1 8 15 22 29 5 12 19 26 4 11 18 25 31

1. Scope
  - a. Level of
  - b. Geographic
  - c. Combat
2. Organizational
  - a. TOE organi
  - b. MTOE organ
  - c. Hybrid org
  - d. TF/TM orga
3. Area of Operat
  - a. Season
  - b. Map sheet
4. Scenario
  - a. Maneuver
    - (1) Comma
    - (2) Contr
    - (3) Attac
    - (4) Defen
  - b. Fire supp
  - c. Obstacles
5. Doctrine and T
  - a. Criteria f
  - new or additi
  - incapacitated
  - replace casual
6. Suppression Effects
  - (1) Enemy weapons
  - (2) Friendly weapons

Suppression Effects  
(1) Enemy weapons  
(2) Friendly weapons

## SPECIFIC INPUT

level of conflict  
geographical area of  
combat  
combat operations

zational Data  
organization  
DE organization  
grid organization

/TM organization

Operations

ison

sheet numbers

o  
ever

Command and control

Control measures

Attack

Defense

support plan

tacles

and Tactics  
teria for assumption of  
dditional roles by non-  
tated players to  
casualties  
and and control  
teria for committing res.

6. Parametric Inputs
  - a. Suppression effects
    - (1) Enemy weapons
    - (2) Friendly weapons
  - b. Target detection (queue)
  - c. Vulnerabilities
  - d. Small arms accuracy (add models are required for each combination of factors shown) by weapon
    - (1) Mode of fire
    - (2) Category of fire
    - (3) Target category
    - (4) Target exposure

NOTE: 4 modes x 4 categories x 2 targets x 3 exposures = 96 modes

- e. Systems accuracy

### 7. Output Requirements

8. Analytical Input Requirements
  - a. Independent variables to be examined
  - b. Measures of effectiveness
  - c. Magnitude of values (range)
  - d. Experimental design

6  
**OUTPUT REQUIREMENTS**

**ANALYSIS**

**SAG**

**SCOPE**

**ORGANIZATION**

**AREA OF OPERATION**

**SCENARIO**

**DOCTRINE AND TACTICS**

**PARAMETRIC INPUTS**

NOTE: 4 modes x 4 categories  
x 2 targets x 3 exposures = 96 modes

Measures of effectiveness

Experimental design

Independent variables to be

Weather  
(1) Temperature  
(2) Winds  
(3) Precipitation  
(4) Visibility  
(5) Cloudiness

Vegetation Data  
(1) Trees  
(2) Scrub growth  
(3) Commercial crops  
(4) Grasses  
(5) Surface soil  
(6) Surface soil map  
sheet number

Command and control  
Criteria for committing reserves  
Criteria for changing formations  
Criteria for changing from Fire and  
Maneuver to Fire and Movement and  
vice versa

Small Arms Accuracy  
(1) Mode of fire  
(2) Category of fire  
(3) Target category  
(4) Target exposure  
NOTE: 4 modes x 4 categories  
x 2 targets x 3 exposures = 96 modes

Systems Acc  
Mounted wea  
(type rou  
status, dy  
static ta

(5) BTR 40 P  
(6) BTR 60 P/C  
(7) M113  
(8) M114

7  
8  
es to be examined [REDACTED] Magnitude of values (range) [REDACTED]

Obstacles

(1) Type  
(2) Location  
(3) Characteristics

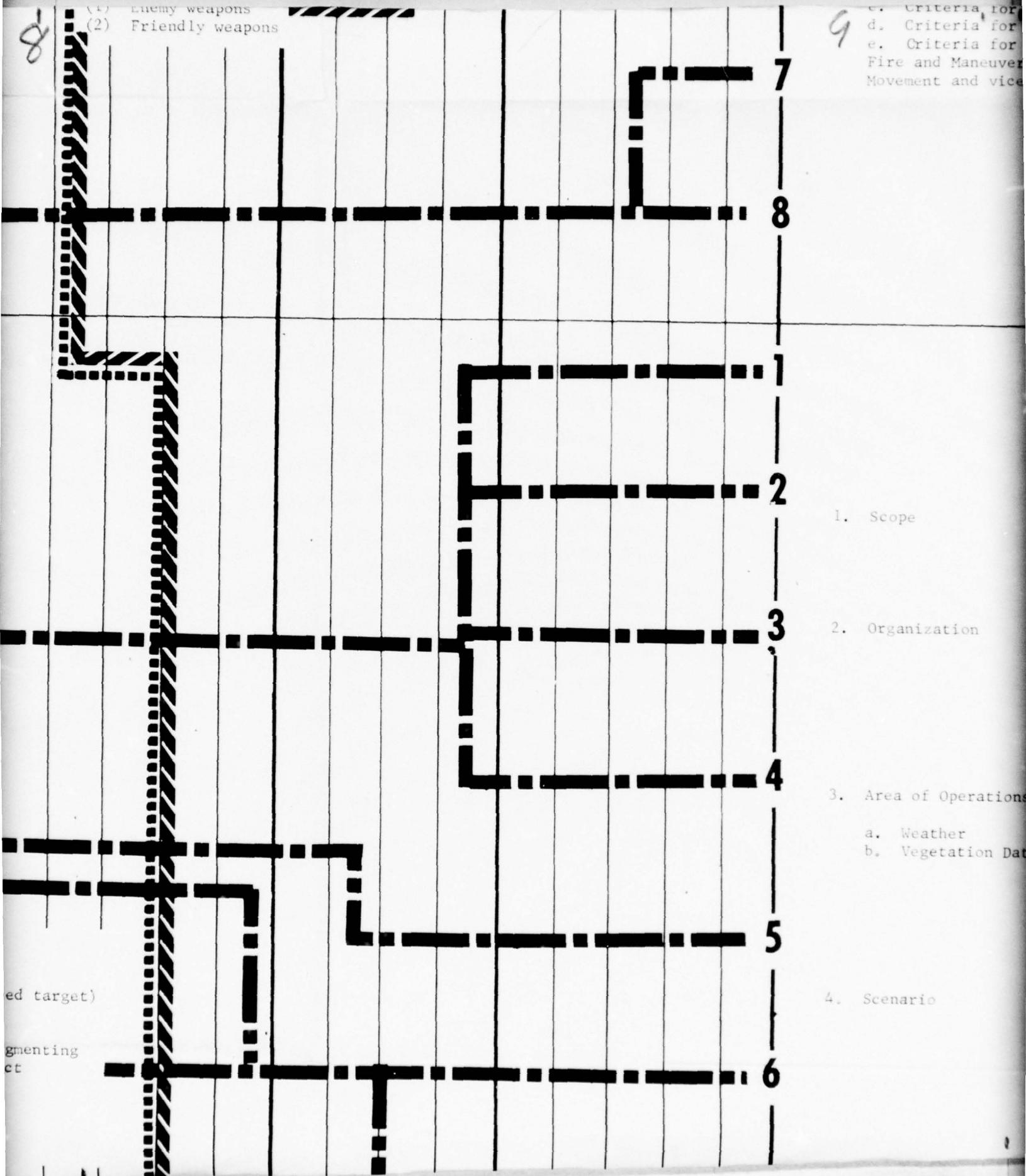
Human Factors

(1) Demarcation of body region  
(2) Anatomical distribution of wounds  
(3) Modified anatomical distribution (reduced target)  
(4) Wound classification  
(5) Incapacitation categories  
(6) Fragment penetration depth for each fragmenting munition to include grain size and impact velocities  
(7) Loss in soft tissue penetration  
(8) Soldier dimensions  
(9) Protective armament

ms Accuracy  
ed weapons systems  
be round, movement  
tus, dynamic or  
tic targets)

Base Ratio of Movement

(1) Mounted  
(2) Dismounted



a for committing res.  
a for changing form.  
a for changing from  
neuver to Fire and  
d vice versa.

10

5. Doctrine and Tactics

6. Parametric Inputs

- a. Human Factors
- b. Base Ratio of Movement

7. Output Requirements

8. Analysis

## OUTPUT REQUIREMENTS

## ANALYSIS

## SOURCE AGENCY

AMC

USASASA

**USACDCMA**

ASARS II INPUT

AM. 1000 0400, 0500  
TAKEN 0400 DATA

Number of levels to be investigated for each independent variable

Type regression model to be employed in the analysis

Highest order interaction to be detected

LITTON SYSTEMS CONTRACT  
TO USASASA ON SUPPRESSION

RELIABILITY  
SUSTAINABILITY  
MAINTAINABILITY  
FRIENDLY & ENEMY WPNS

7

8

K E Y

..... CRITICAL INTERDEPENDENCY

..... COORDINATED EFFORT (JOINT)

..... LESS CRITICAL INTERACTION AND  
LOGICAL SEQUENCING TO SATISFACTION

..... CRITICAL PATH

..... PREPARATION PHASE (START WORK)

14

ASARS BATTLE SIMULATION

SYSTEMS ANALYSIS GROUP

1300-1700 - 16 June 1971

This presentation was given by SAG personnel who described the "can do" and "cannot do" aspects of the simulation under development, the executive routine, and expansion of each of the blocks in the executive routine to permit an understanding of the methodology, capabilities and limitations of the model. An example of the Phase C model expansion and programming was presented.

## ASARS II BATTLE MODEL

### Description of the Executive Routine

1. The Executive Routine of the ASARS II Battle Model is a graphical representation of the principal tasks to be achieved in developing the model. Each individual functional area can be researched and expanded into a basically self-contained block of logic. Eventually, a complex simulation, containing all the necessary decision rules and algorithms, will evolve from this step-by-step expansion of the flow charts.
2. There will be numerous, very detailed data requirements for this model. However, complex situation dependent decisions will be made by the model, not the inputs. Examples of some of the required data might be weapons characteristics, formations for a given organizational echelon facing a given threat, and the mission of each unit. The model will be scenario independent to the extent that a range of typical scenarios can be used.
3. Both the scenario and the battlefield are inputs. The micro-terrain preprocessor will impose the former onto the latter. Any terrain characteristic which can be identified on a map will be considered macro-terrain and will be read in as input. The micro-terrain will be generated in those areas of the battlefield, identified by the scenario, where a detailed representation of terrain (such as large rocks, gullies, trees, etc.) are necessary.
4. The event/time controller will drive the simulation in the computer. Each man/machine weapon system (for example - an infantryman and his rifle) will be referred to as an element. Each element will have its own clock set to that time the element completed his previous event. The controller will search each clock to find the clock with the lowest time, and that element will become the "current element." The "current event" for each current element is defined as a commitment to action during which the element will not alter his activities regardless of the actions of other elements. An event will consist of some combination of observation, communication, movement and firing actions. The duration of the event will be either the natural conclusion of a specific action (such as a projectile striking a target) or a predetermined time interval--whichever is shorter. This interval will be a variable input. For example, when any element initiates assault fire, the maximum event length will be shortened. Once the current element has been processed, its clock is updated by the current event time and the controller searches the clocks for the next current element.

5. The event/time controller will trigger a summary printout of the status of the battle at any time predetermined by the user of the simulation. It will also trigger a representation of the battlefield effects of non-organic resources such as supporting fire, tactical and army air forces.

6. The intelligence model will contain an acquisition submodel. However, its broader purpose will be to maintain the current status of the knowledge of the enemy. It will update this status by means of a communications model. This model will simulate the transmission of messages to both organic and non-organic elements such as the aforementioned supporting fire, tactical and army air forces.

7. The movement controller and the fire controller simulate the thought processes of the leadership elements of the two opposing forces. There will be a great deal of interaction between these two models in order to **portray dynamic fire and maneuver, fire and movement, and assault fire tactics**. The movement controller will select a route, when appropriate, and a formation for those elements under the control of the leadership element. The fire controller will assign firing sectors, analyze the threat determined by the intelligence model, and select targets, weapons and ammunition. No clock time will elapse during these thought processes.

8. As a result of the decisions made in the movement controller and the fire controller, the current element will have the option of initiating either fire and movement or assault fire. Either of these tactics can be initiated or concluded at any time during the battle. Furthermore, different units can use different tactics at the same time. The relationship between these tactics and the movement and firing models is as follows:

- a. Fire and movement - move and/or fire.
- b. Fire and maneuver (stealth) - move or fire.
- c. Assault fire - move and fire.

9. The movement model will determine movement velocities and time, along with the calculation of new coordinates for each element. Minefields and other obstacles will be considered. The movement model will attempt to follow the route selected by the movement controller. Deviations from these routes will be caused by the dynamics of the situation.

10. The firing model will accept the fire discipline imposed by the fire controller and the target parameters developed in the intelligence model at a battlefield location determined by the movement controller and the movement model. The flow chart graphically represents the extensive

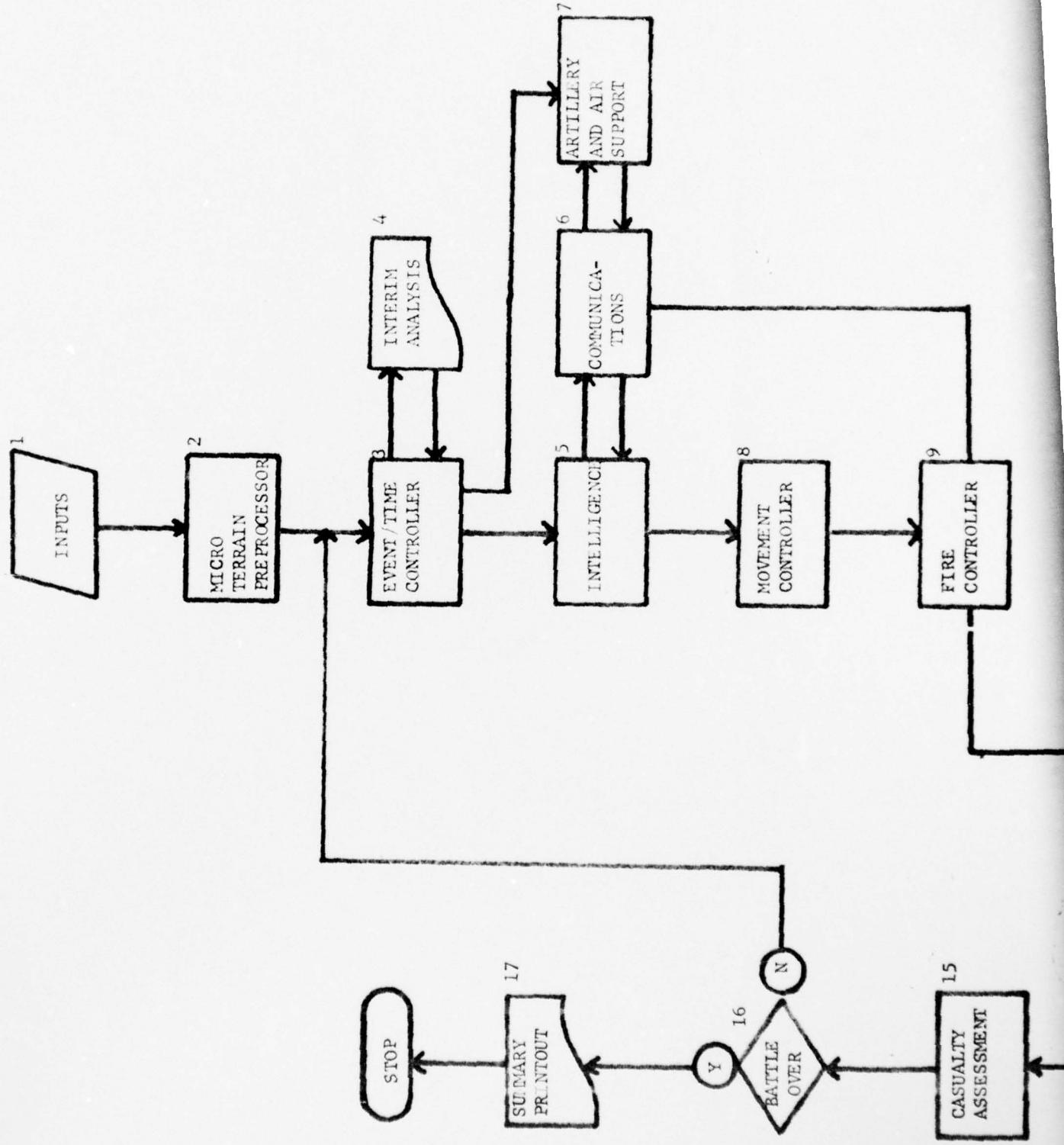
manipulation of parameters required before the actual firing can begin. The firing model itself will determine the firing time and whether or not a hit occurred.

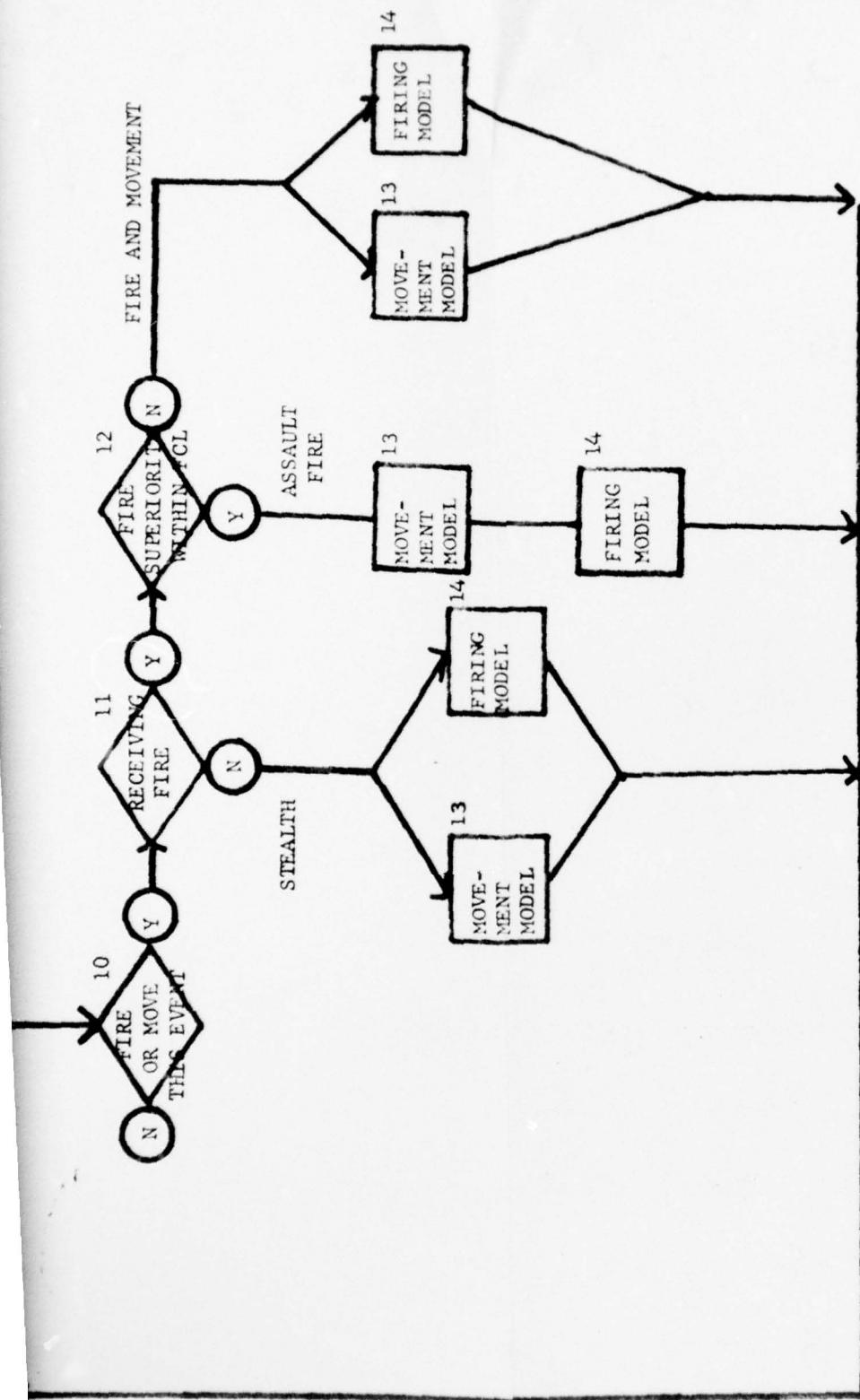
11. The last functional area of the model is casualty assessment. At this time, the determination of a kill given a hit will be made. Evacuation of casualties will be considered. Any necessary regrouping and reassigning of responsibilities to other elements will be done.

12. If the battle is now completed, a summary of what happened will be printed. If the battle is not over, the computer will return to the event/time controller, update the element's clock by whatever increment of time has actually been expended, and loop through the model again.

13. In summary, the Executive Routine provides a logical framework upon which all subsequent model design can be added.

EXECUTIVE ROUTINE





12

AGENDA FOR DISCUSSION OF ASARS II BATTLE MODEL

1300 - 1400	BACKGROUND GENERAL CONSIDERATIONS EXECUTIVE ROUTINE	MR. GOLDBERG
1400 - 1500	TERRAIN SUBMODEL INTELLIGENCE SUBMODEL COMMUNICATE SUBMODEL	MR. DRUZBICK
1500 - 1600	MOVEMENT CONTROLLER SUBMODEL MOVEMENT SUBMODEL	MR. BELKNAP
1600 - 1700	FIRE CONTROLLER SUBMODEL FIRING SUBMODEL CASUALTY ASSESSMENT SUBMODEL	MR. CARSON MR. DRUZBICK

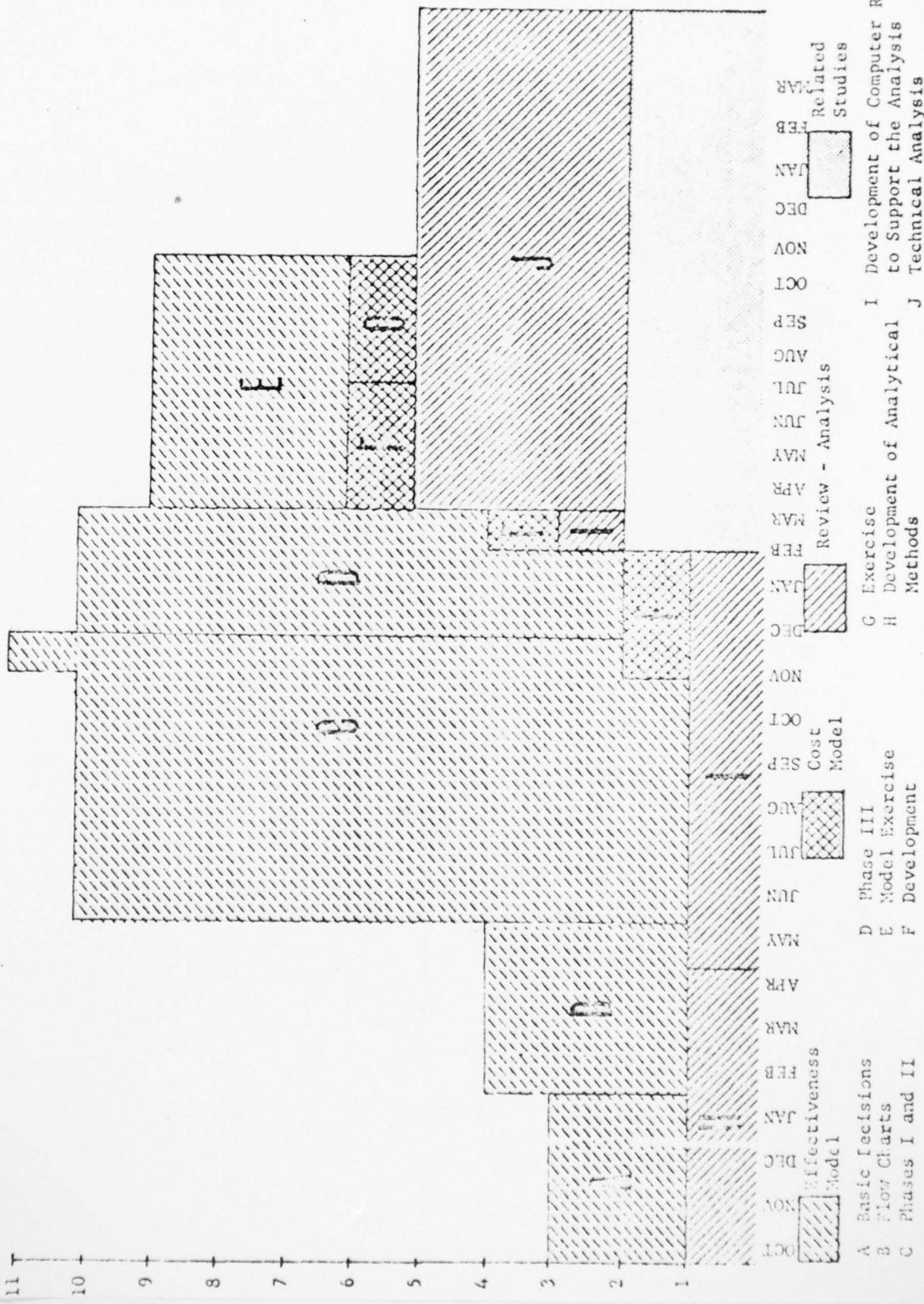
COMPLETED ASARS II MODEL SUPPORT

# CAN DO

LEVEL	LIGHT	MOBILITY AND FIRE SUPPORT	MODEL
Platoon (Individual Soldier)	Day	Dismounted--No External Fire Support	ASARS II Battle Model and SLAF
		Dismounted--External Fire Support	ASARS Battle Model and SLAF
		Mounted Then Dismounted In Sequence	DYNTACS and ASAR Battle Model
Battalion (Squad)	Night	All Mounted Throughout	DYNTACS--Model
		<u>Also</u> --Anything which doesn't move.	

# CAN'T DO

Simultaneous movement of ground mounted or air-transported elements and dismounted troops  
Play of air movements of troops which would have a real effect on the combat being modeled



## FLOW CHART

## EXPLANATION

## INPUTS REQUIRED

3.5 - 8.7

SUBROUTINE MICOP DETERMINES  
WHEN THE COMBAT OUTPOST  
WITHDRAWS TO ITS PRIMARY  
DEFENSIVE POSITION



8.5.1

$X = ELOCX (I)$   
 $Y = ELDGY (I)$

DETERMINE X AND Y  
COORDINATES OF OUTPOST  
COMMANDER

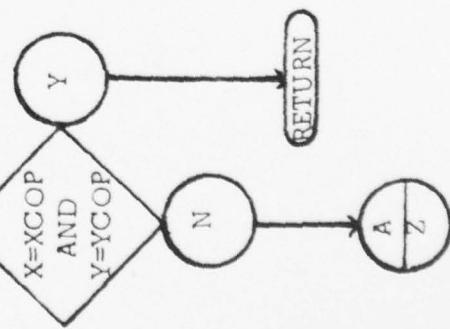
ELOCX (I)  
X COORDINATE OF CURRENT ELEMENT

$I = 1, \dots, N$  ELEMENTS

ELDCY (I)  
Y COORDINATE OF CURRENT ELEMENT

$I = 1, N$  ELEMENTS

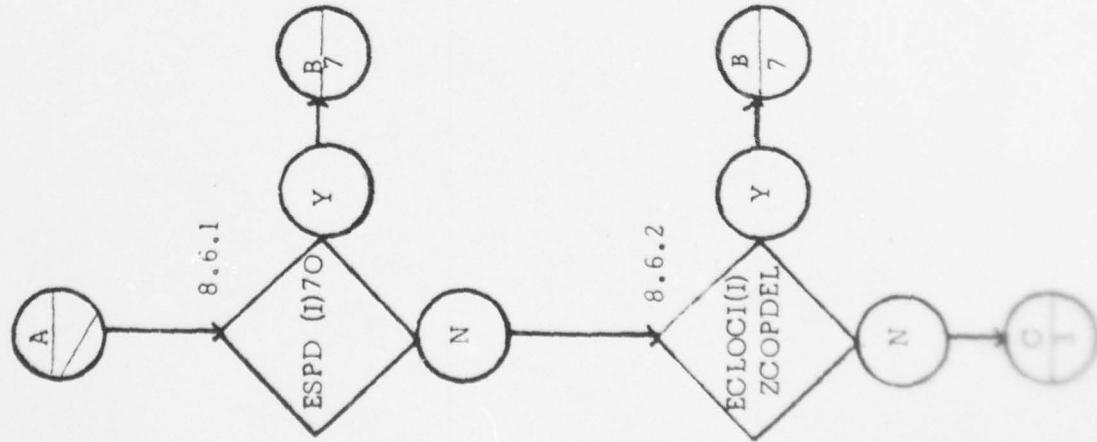
X COP AND Y COP  
X AND Y COORDINATES OF PRIMARY  
POSITION OUTPOST COMMANDER MUST  
WITHDRAW TO



## FLOW CHART

## EXPLANATION

## INPUTS REQUIRED



8.6.1  
**ESPD (I) O**  
 IF THE OUTPOST IS ALREADY  
 MOVING TO A DEFENSIVE  
 POSITION, THE CURRENT SPEED  
 OF THE OUTPOST COMMANDER  
 WILL BE GREATER THAN ZERO.

ESPD (I)

SPEED OF EACH ELEMENT  
 $I = 1, \dots, N$  ELEMENT NUMBERS

8.6.2  
**ECLOC(I) ZCOPDEL**  
 THE COP WITHDRAWS IF ENOUGH  
 BATTLE TIME HAS ELAPSED

ECLOC (I)

ELAPSED BATTLE TIME FOR  
 EACH ELEMENT  
 $I=1, \dots, N$  ELEMENT NUMBERS

COPDEL  
 BATTLE TIME SPECIFIED BY  
 HIGHER AUTHORITY FOR COP  
 WITHDRAWAL

## FLOW CHART

## EXPLANATION

INPUTS REQUIRED

```

graph TD
    Start(( )) -- 2 --> D1{OPFLAG=1 ?}
    D1 -- 8.6.3 --> B7((B/7))
    D1 -- 8.6.4 --> JBegin[J=JBEGIN]
    B7 --> D((D))
    JBegin --> D
  
```

HAS A WITHDRAWAL MESSAGE  
FROM THE COMMANDING  
OFFICER OF THE DEFENSIVE  
FORCES BEEN RECEIVED?

OPFLAG 0 INDICATES OUTPOST WITHDRAWAL  
MESSAGE NOT RECEIVED

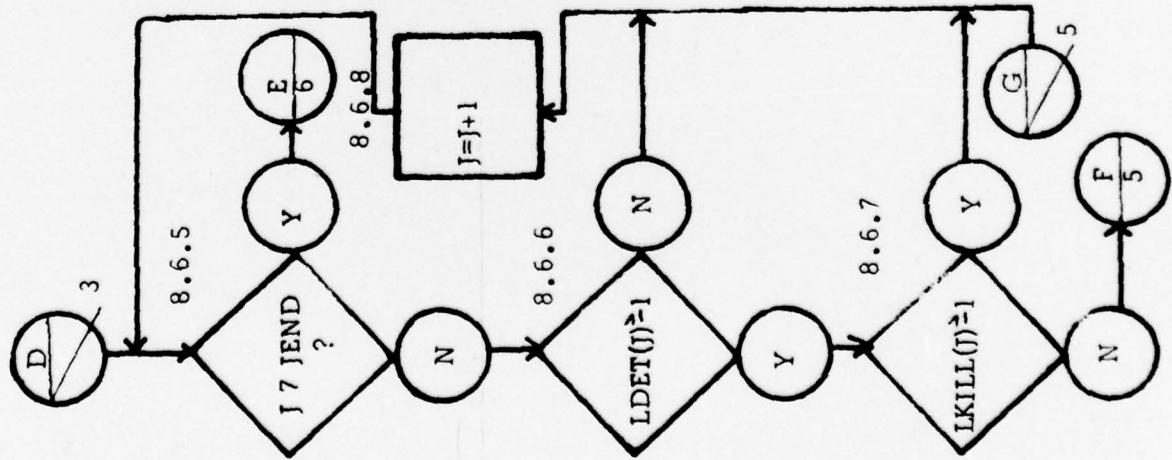
BEGIN      LOWEST ELEMENT NUMBER OF  
ANY ATTACKING ELEMENT

OBTAI ELEMENT NUMBER OF  
FIRM ATTACKING ELEMENT

## FLOW CHART

## EXPLANATION

## INPUTS REQUIRED



IS LOOP THRU ALL ATTACKING ELEMENTS COMPLETED?

HIGHEST ELEMENT NUMBER  
OF ANY ATTACKING ELEMENT

GO TO NEXT ENEMY ELEMENT

LDET (1) (SEE INTELLIGENCE MODEL)

IS ATTACKING ELEMENT (J)  
DETECTED BY OUTPOST  
COMMANDER?

LKILL(1) (SEE CASUALTY ASSESSMENT)

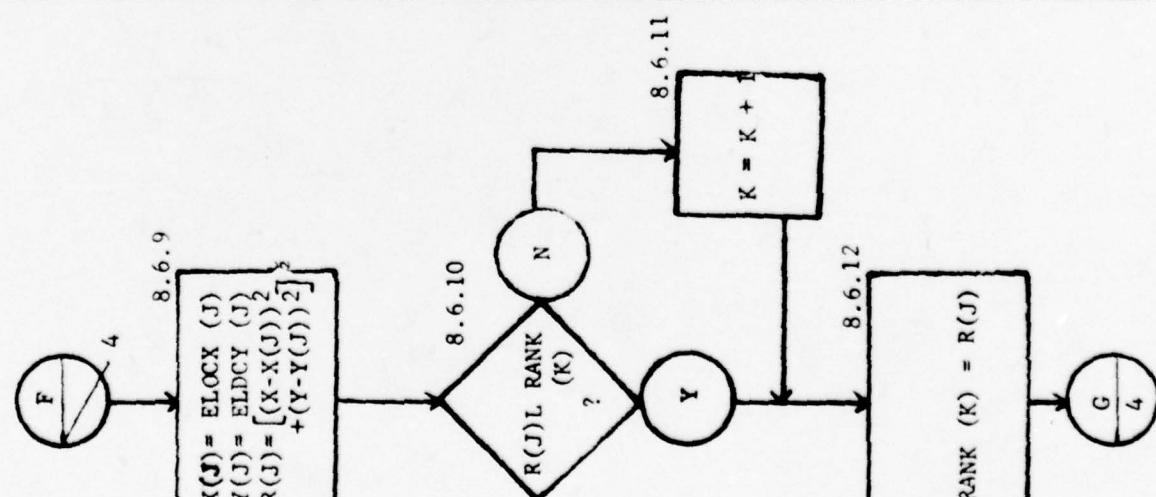
IS ATTACKING ELEMENT (J)  
A CASUALTY?

111

## FLOW CHART

## EXPLANATION

## INPUTS REQUIRED



SEE 8.5.1

ELOCX(J)  
ELOCY(J)

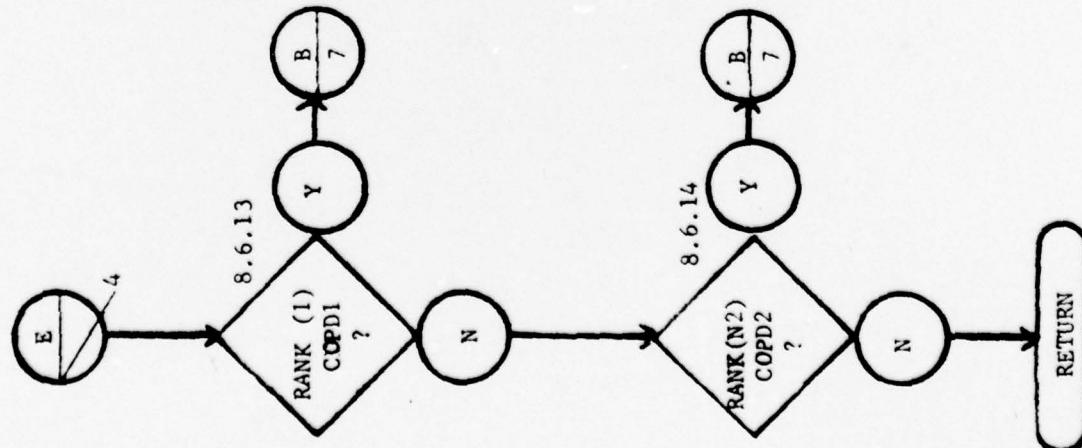
OBTAIN COORDINATES OF EACH SURVIVING DETECTED ENEMY ELEMENT AND CALCULATE DISTANCE OF EACH TO OUTPOST COMMANDER

THE ENEMY ELEMENTS ARE RANKED IN ORDER OF ASCENDING DISTANCE TO THE OUTPOST COMMANDER

## FLOW CHART

## EXPLANATION

## INPUTS REQUIRED



IF THE CLOSEST ENEMY IS WITHIN  
AN INPUT DISTANCE OF THE OUTPOST,  
THE OUTPOST WITHDRAWS

COPD1  
A RADIAL DISTANCE WITHIN WHICH  
THE EXISTENCE OF ANY ENEMY  
ELEMENT IS SUFFICIENT REASON  
TO WITHDRAW

N<sup>2</sup>  
THE QUANTITY OF ENEMY WITHIN  
DISTANCE (COPD2) WHICH CAUSES  
THE OUTPOST TO WITHDRAW

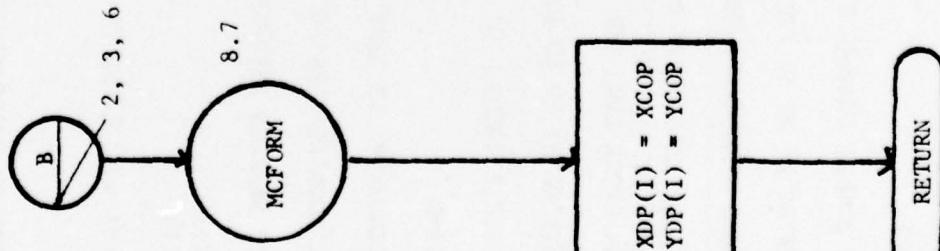
IF A PRESPECIFIED NUMBER OF THE  
ENEMY IS WITHIN AN INPUT DISTANCE  
OF THE OUTPOST, THE OUTPOST  
WITHDRAWS

COPD2  
A RADIAL DISTANCE WITHIN WHICH  
THE EXISTENCE OF A QUANTITY (N<sup>2</sup>)  
OF THE ENEMY IS SUFFICIENT REASON  
TO WITHDRAW

## FLOW CHART

## EXPLANATION

## INPUTS REQUIRED



AS THE OUTPOST WITHDRAWS,  
SUBROUTINE MCFORM ALLOWS THE  
OUTPOST COMMANDER TO CHANGE HIS  
FORMATION BASED ON THE THREAT

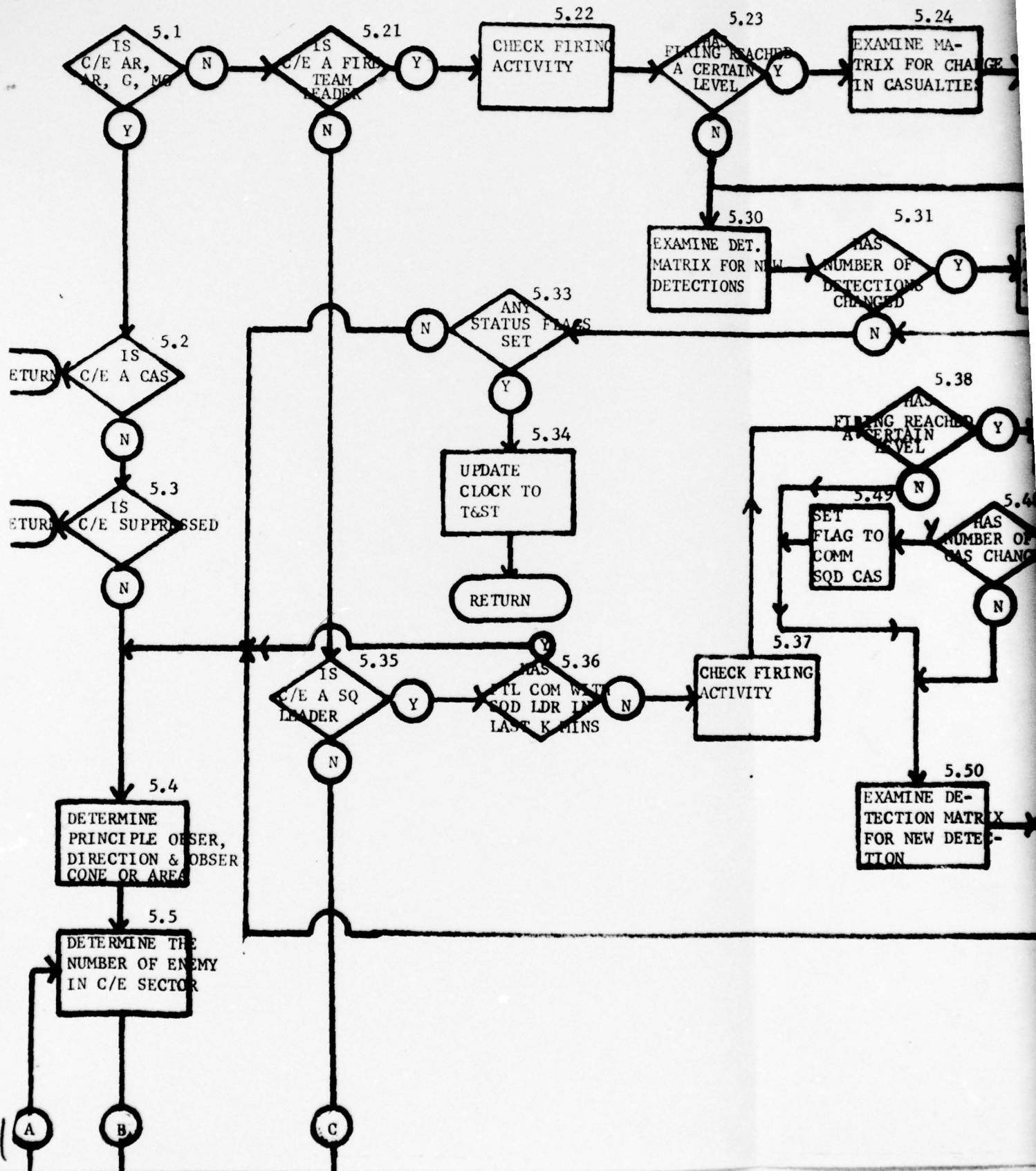
PRIMARY POSITION COORDINATES  
ARE PLACED IN AN ARRAY TO BE USED  
BY THE MOVEMENT MODEL

```

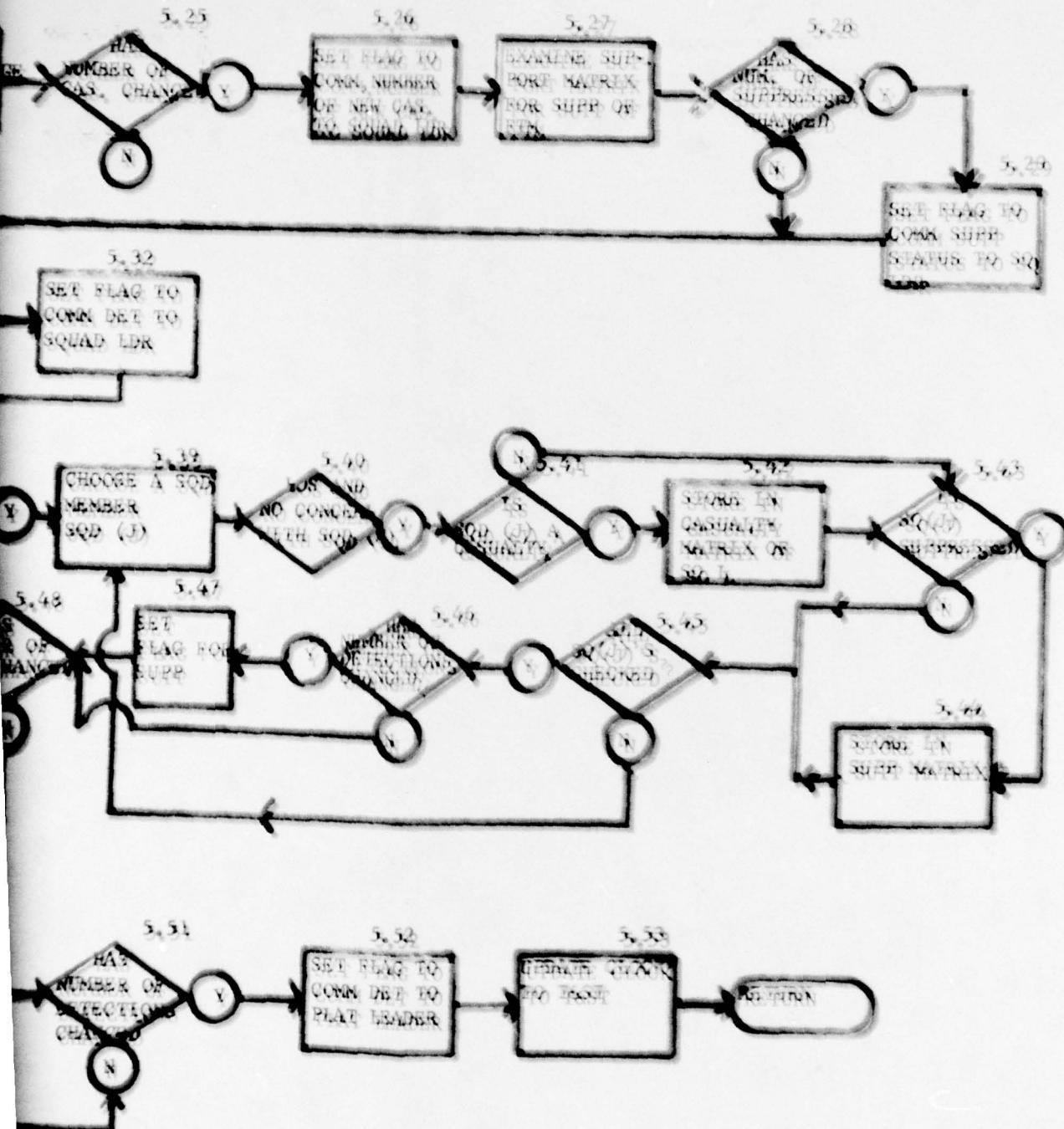
C IF(J.GT.JEND)RETURN
C IF CURRENT ATTACK ELEMENT (J) IS UNDETECTED BY COPC, TRY NEXT J
C IF(LDET(J).LT.1) GO TO 20
C IF OUR DETECTED ENEMY ELEM (DEE) IS A CASUALTY, GO TO 20 AND TRY NEXT J
C IF(LKILL(J).GE.1) GO TO 20
C USING HIS COORDINATES, CALC DEE'S STRAIGHT LINE DISTANCE FROM COPC
C R=SQRT((X-ELOCX(J))**2+(Y-ELOCY(J))**2)
C IF R>COPD1 (MINIMUM RADIAL DISTANCE FOR ONE ENEMY ELEMENT), CALL MCFORM
C IF(R.LE.COPD1)GO TO 100
C COPD2 IS RADIAL DISTANCE WITHIN WHICH N2 ENEMY IS SUFFICIENT REASON TO
C WITHDRAW / IF R>COPD2, INCREASE NDEE BY 1
C IF(R.LE.COPD2)NDEE-NDEE+1
C IF NDEE BECOMES GREATER THAN THE ALLOWED NUMBER (N2) OUTPOST MUST WITHDRAW
C IF(NDEE.GE.N2) GO TO 100
C INCREASE J BY ONE AND CHECK NEXT ENEMY ELEMENT
C GO TO 20
C AS OUTPOST WITHDRAWS, MCFORM ALLOWS COPC TO CHANGE FORMATION BASED ON
C THREAT
C 100 CALL MCFORM (MUN)
C COORDINATES OF PDP ARE PLACED IN ARRAY TO BE USED BY MOVEMENT MODEL
C

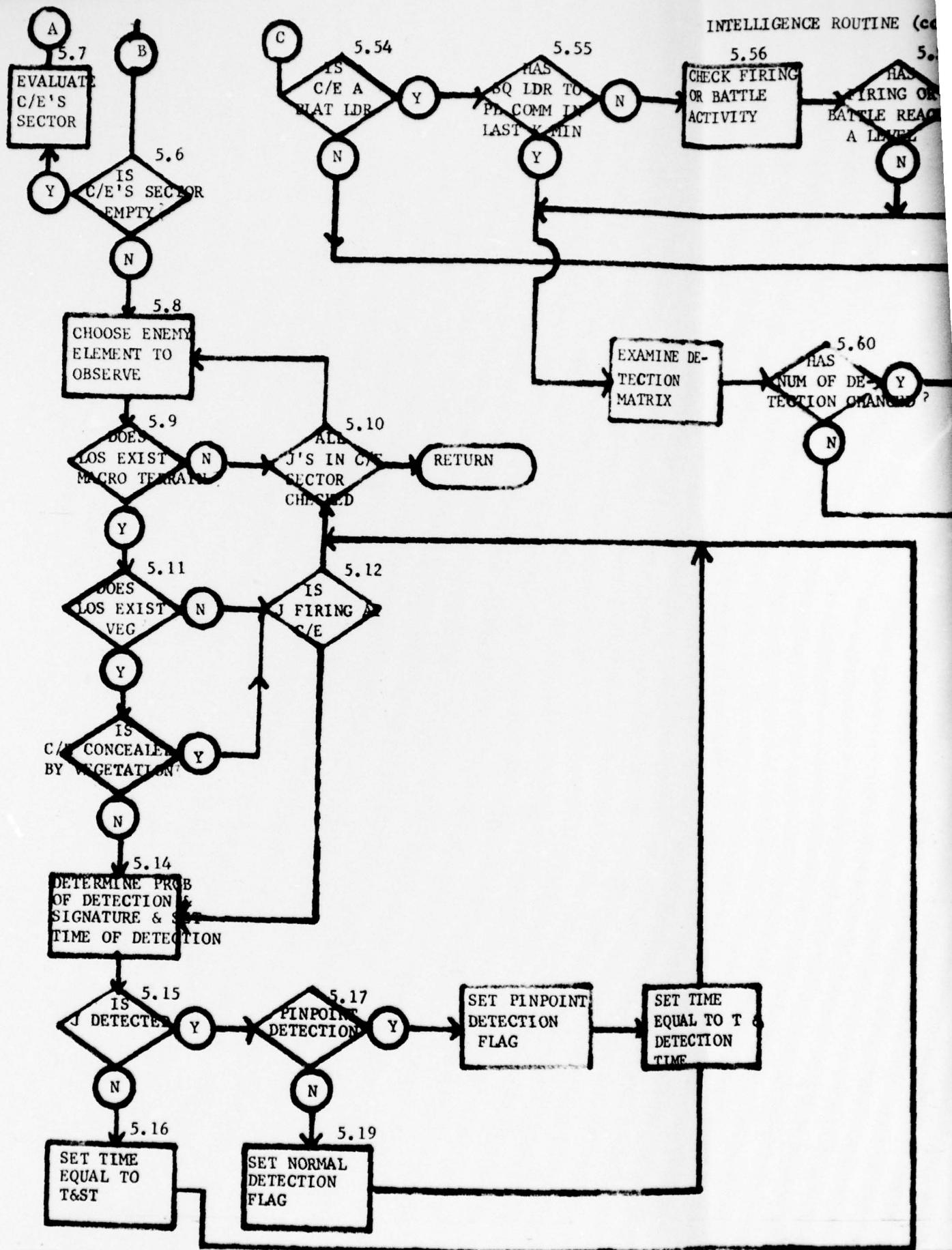
```

XDP(1)=XCP  
YDP(1)=YCP  
C C CONTROL GOES TO MOVEMENT CONTROLLER AND IMMEDIATELY TO EXECUTIVE ROUTINE  
C C RETURN



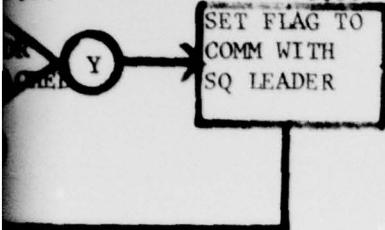
## ROUTINE





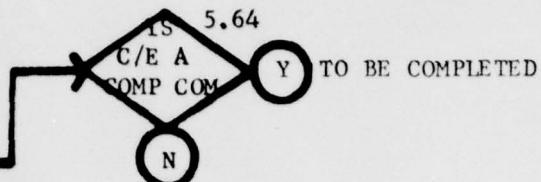
continued)

5.57

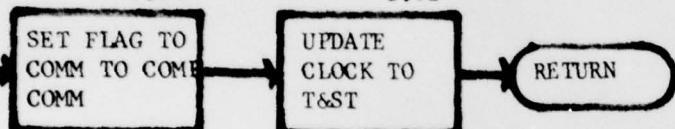


5.58

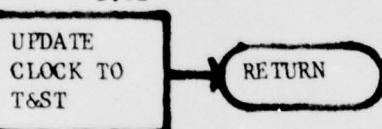
SET FLAG TO  
COMM WITH  
SQ LEADER



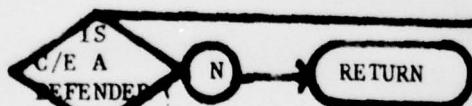
5.61



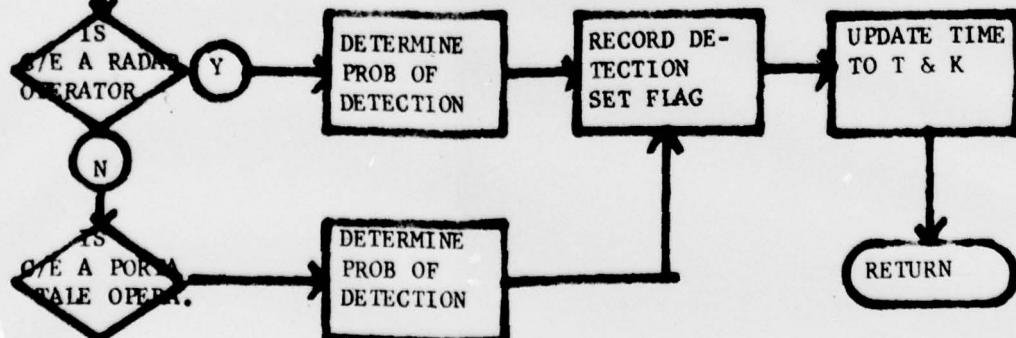
5.62



RETURN



Y



RETURN

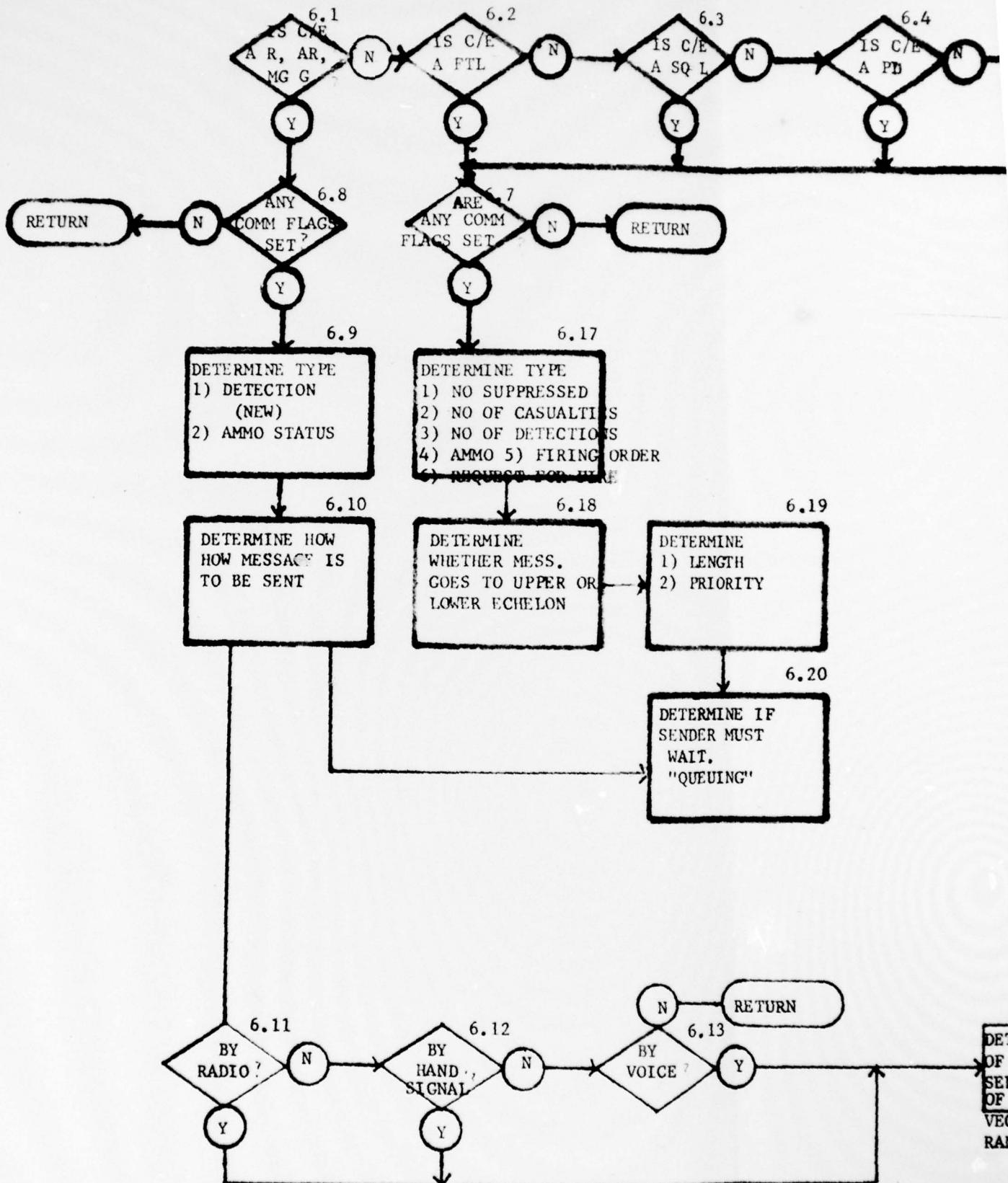
N



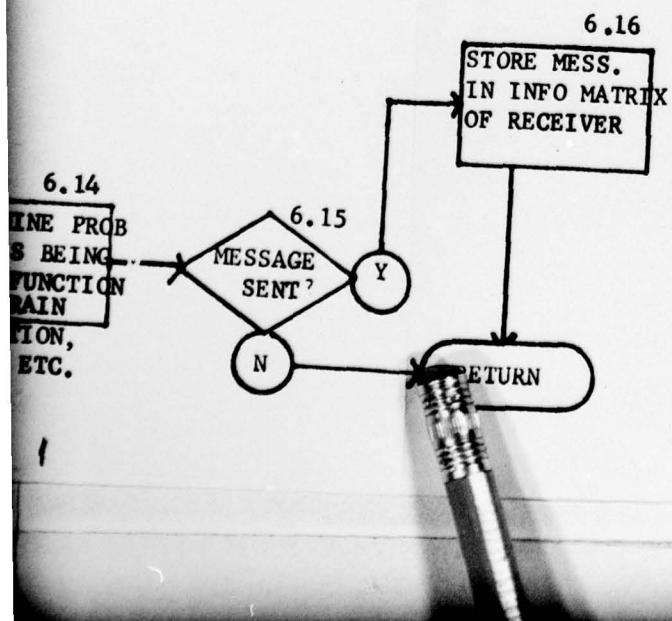
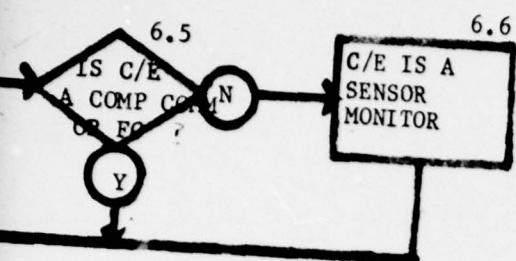
RETURN

2

COMMUNICATION PHA

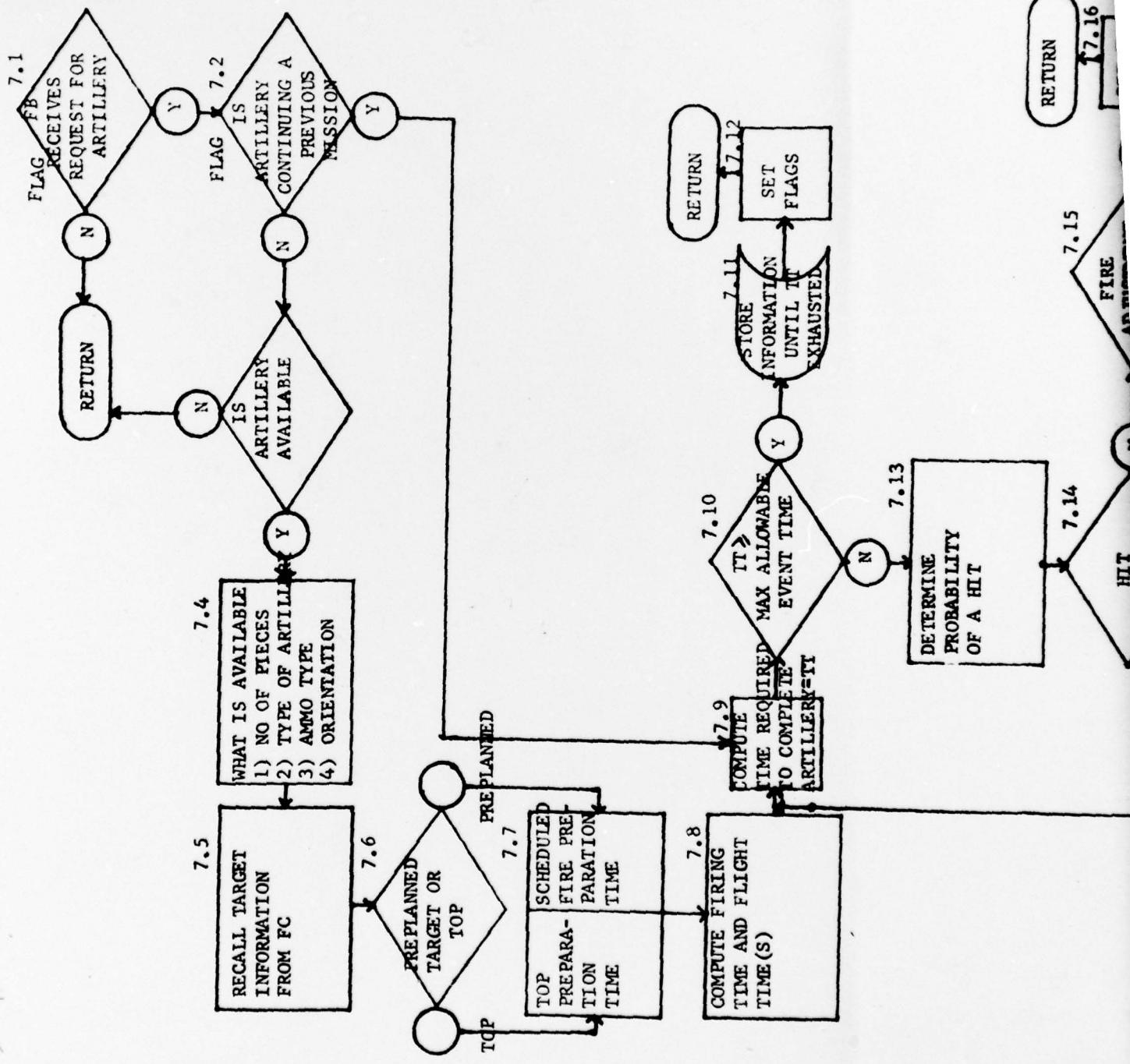


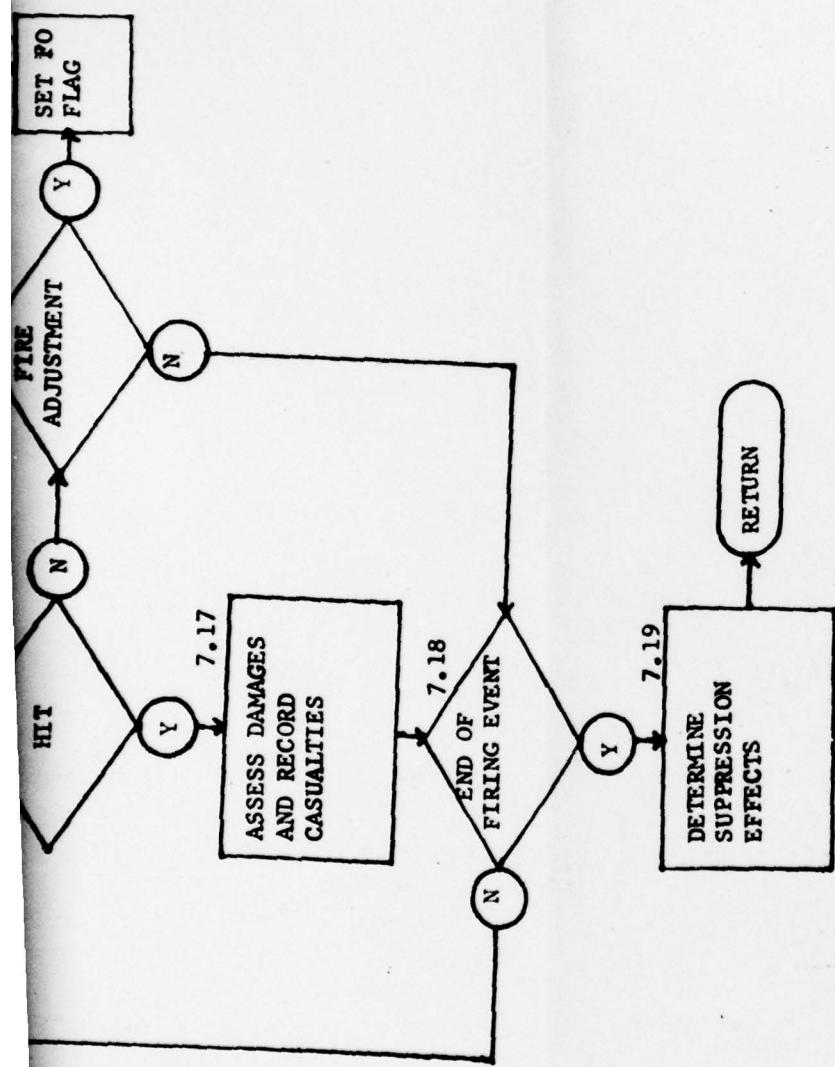
ASE B



2

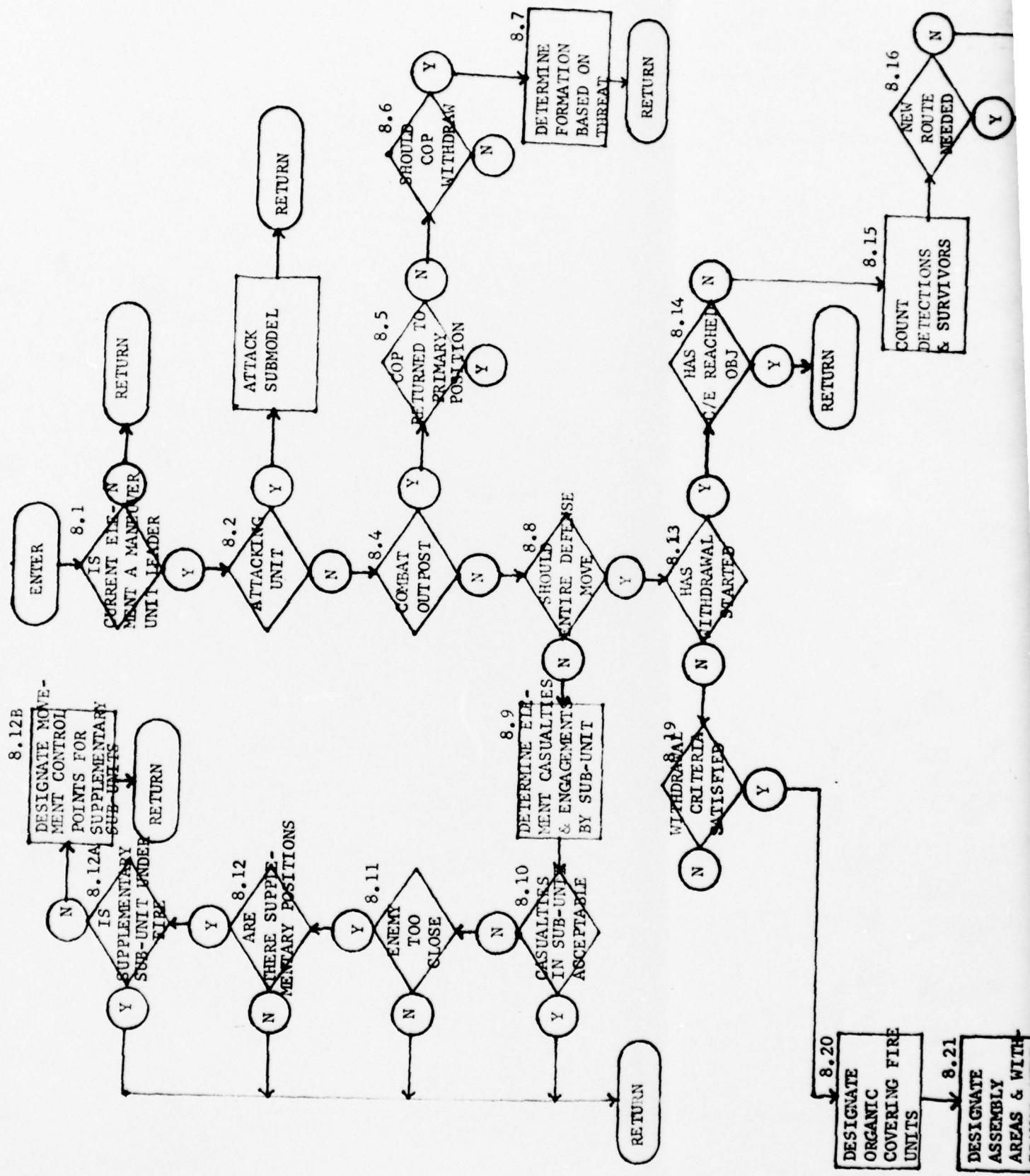
ARTILLERY MODEL

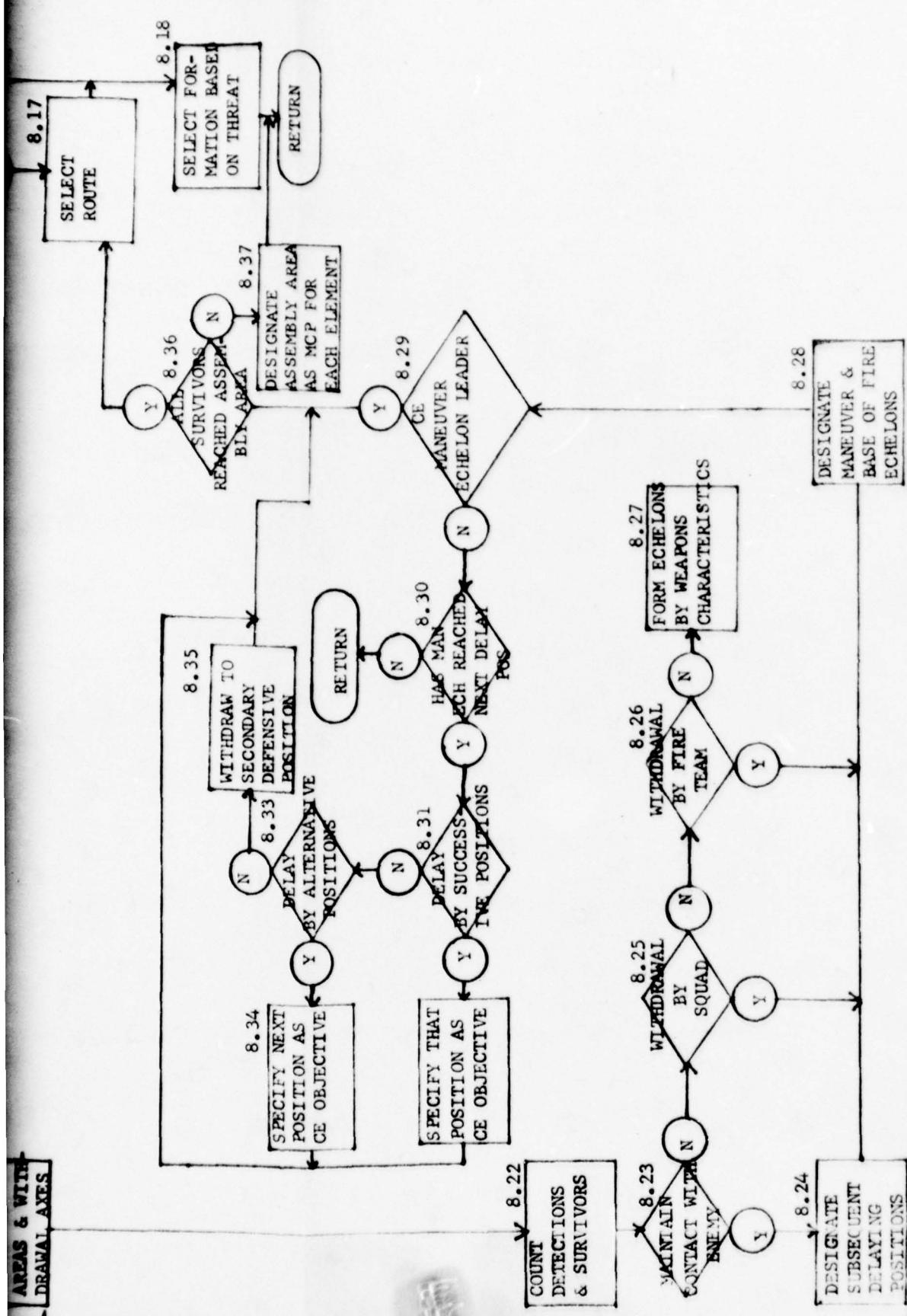




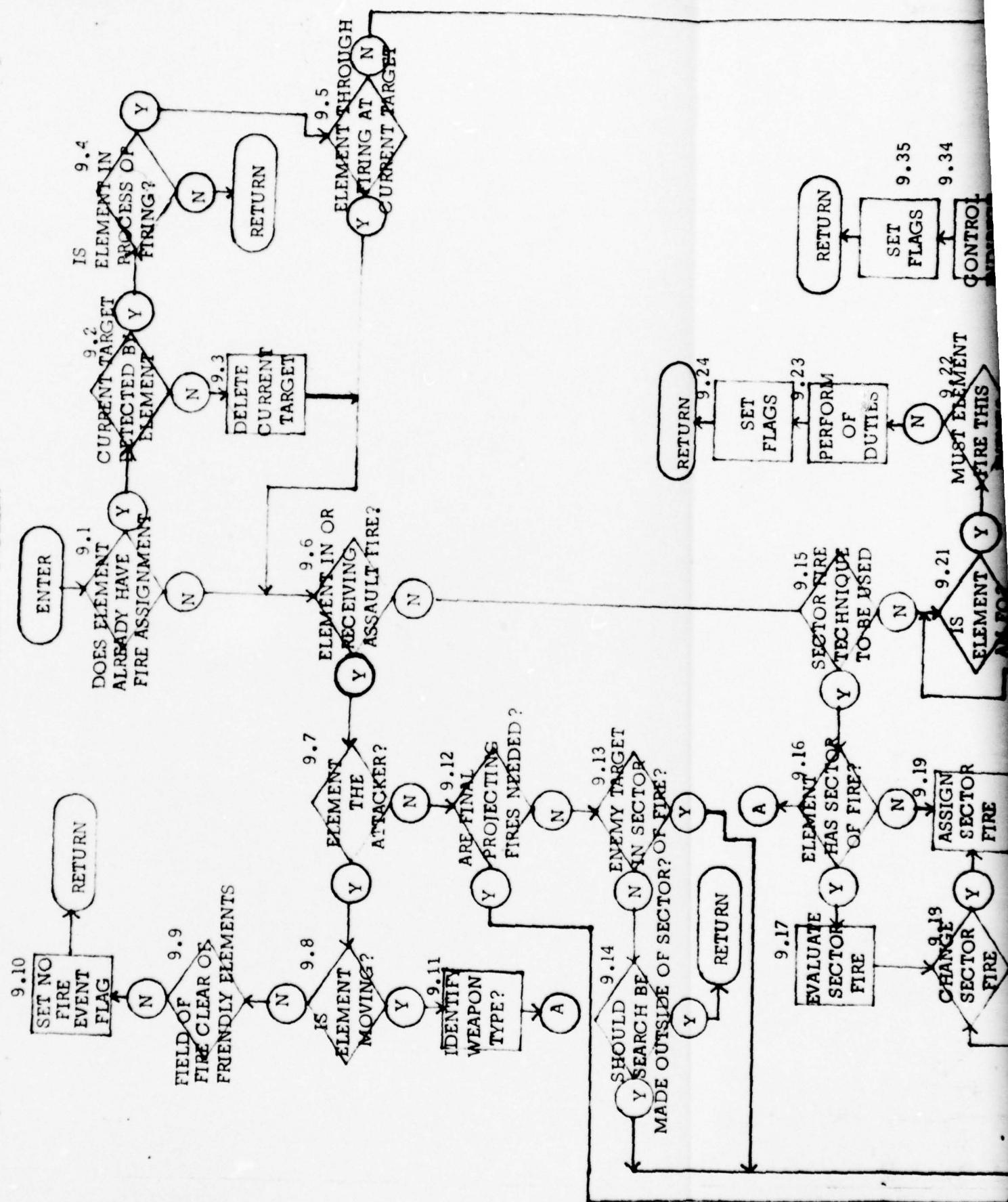
2

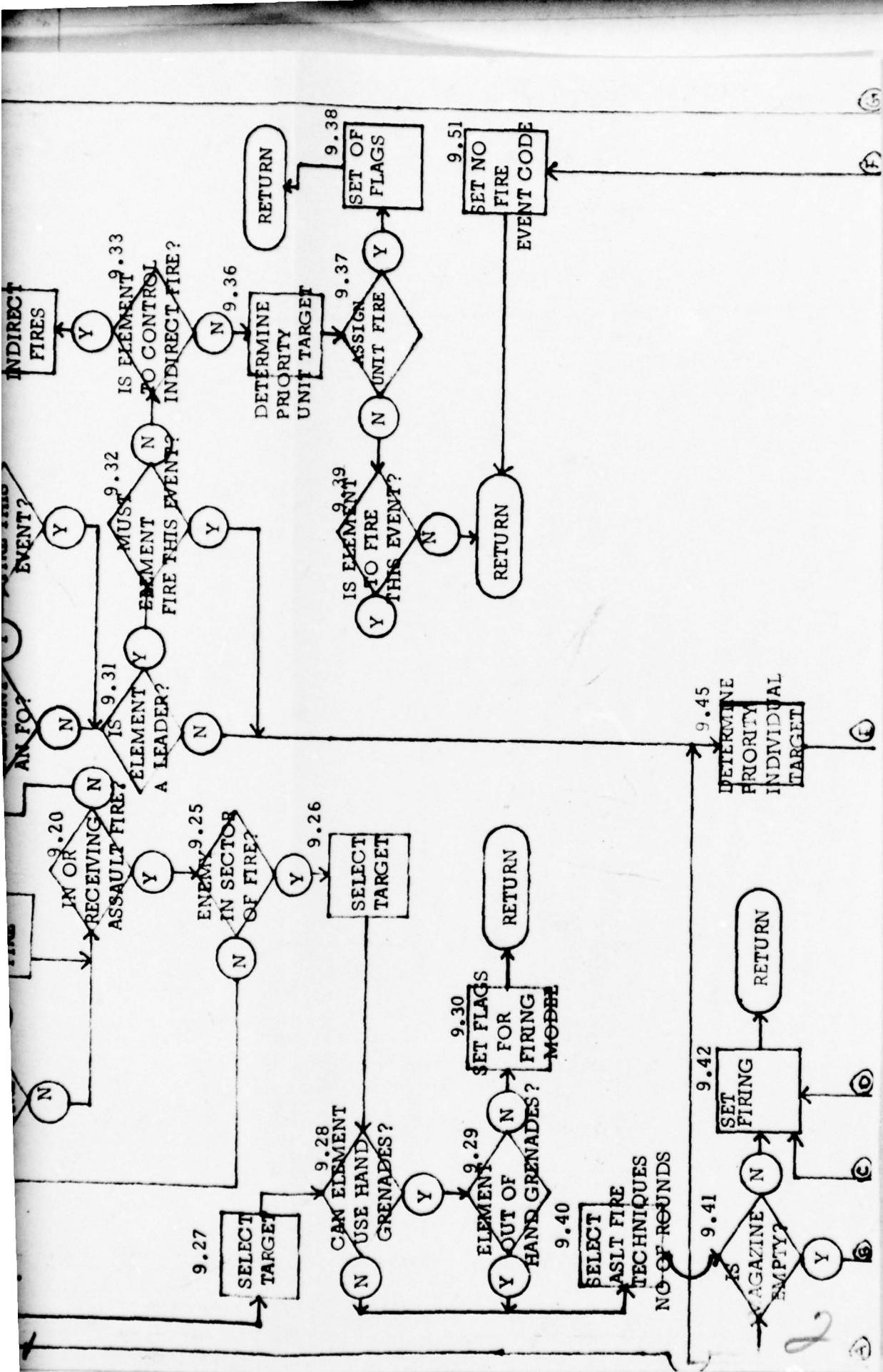
MOVEMENT CONTROLLER



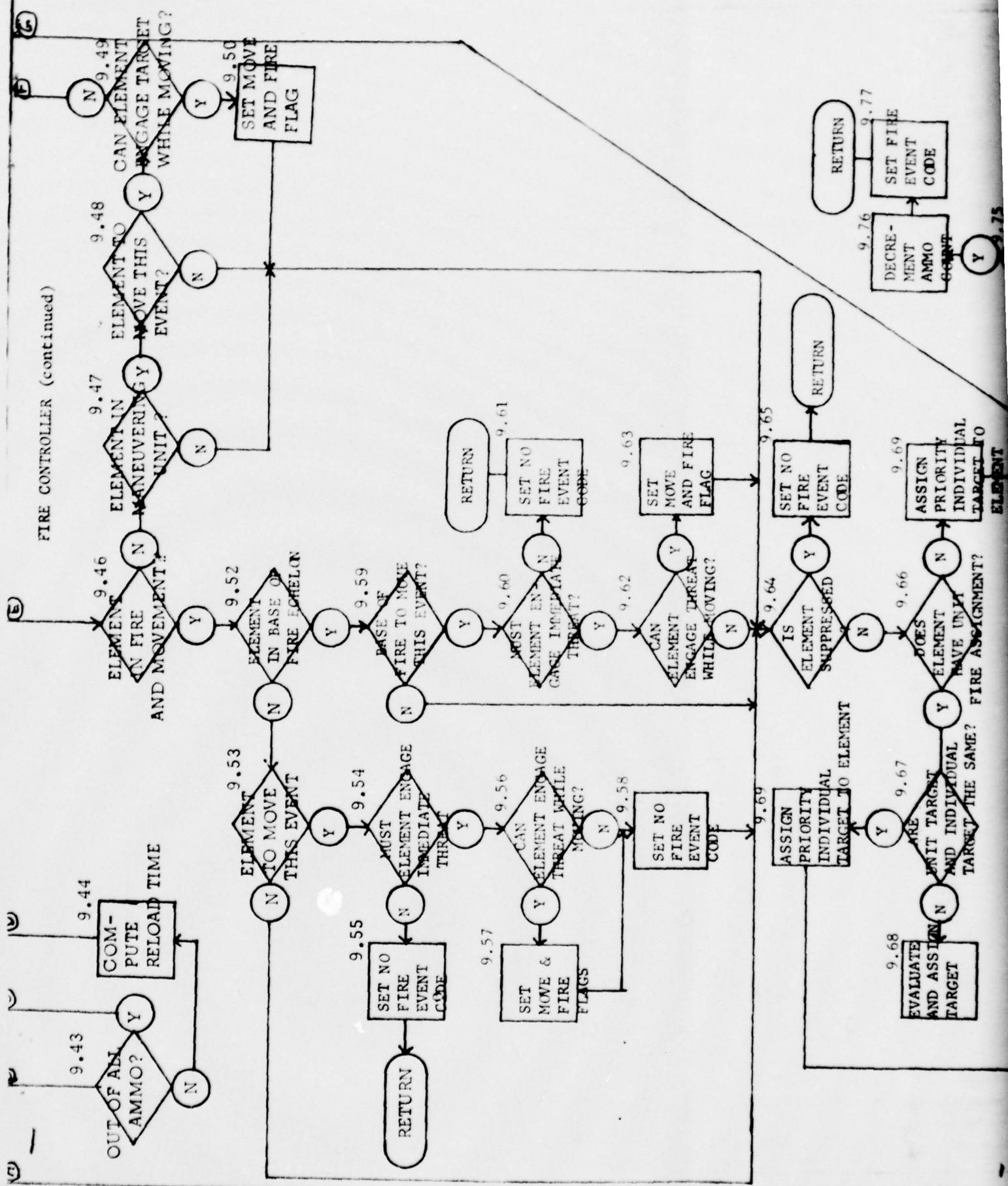


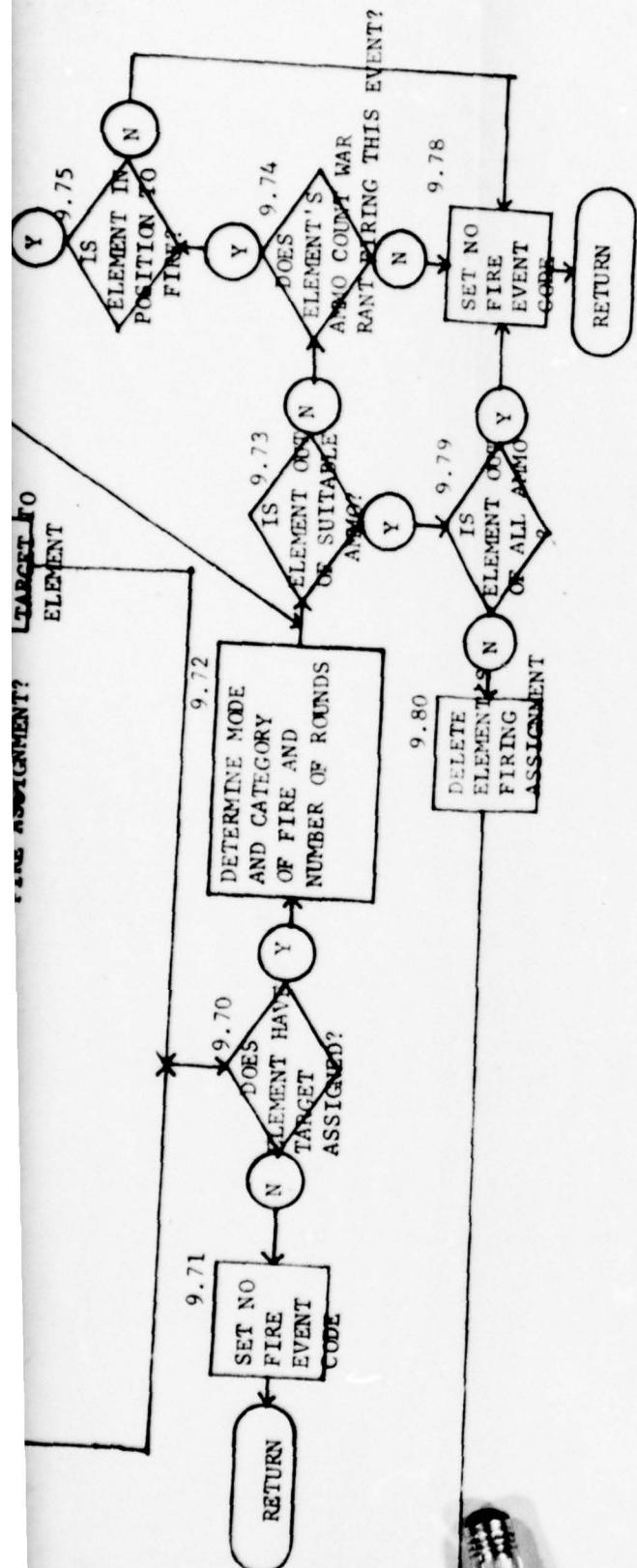
FIRE CONTROLLER



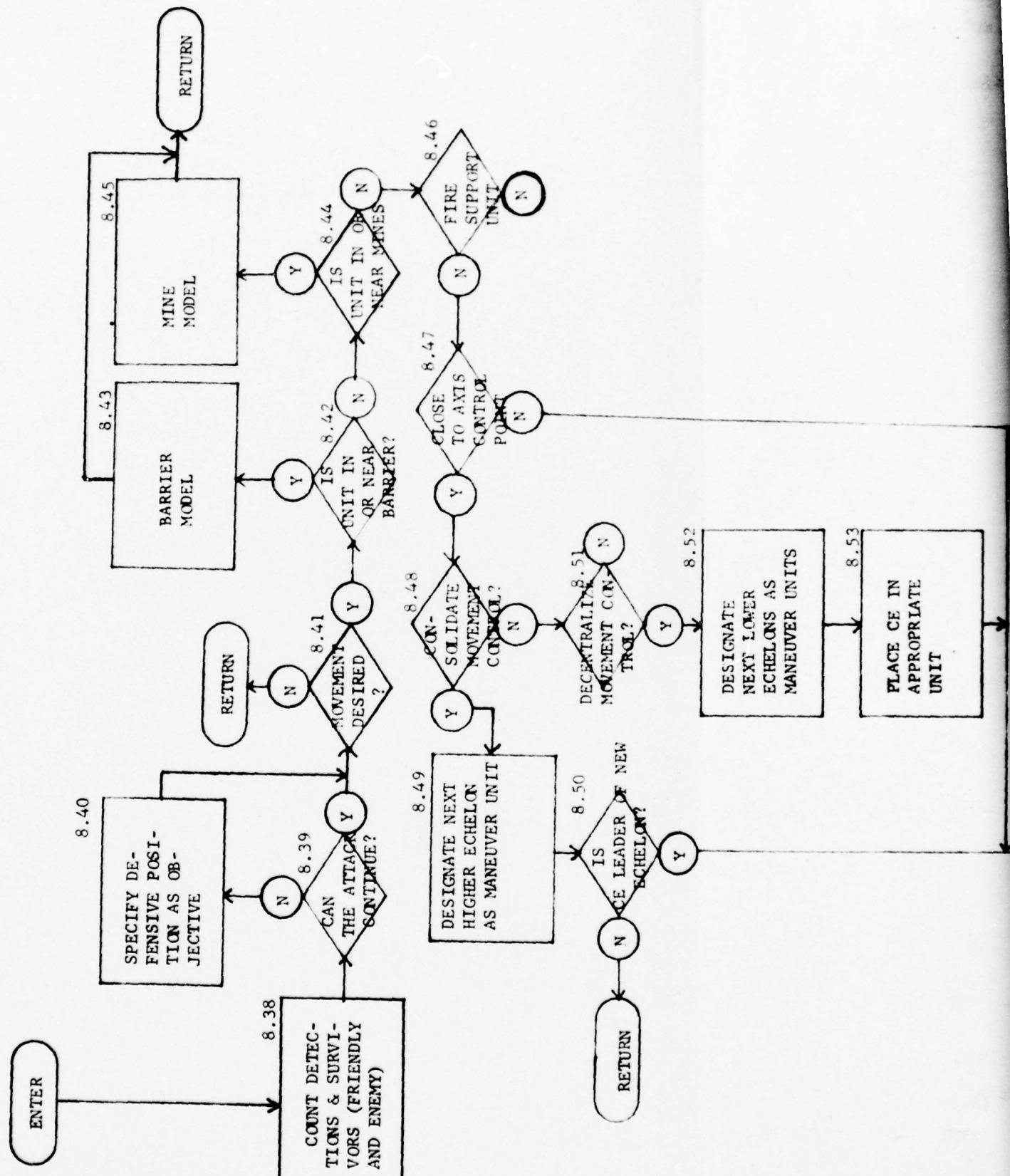


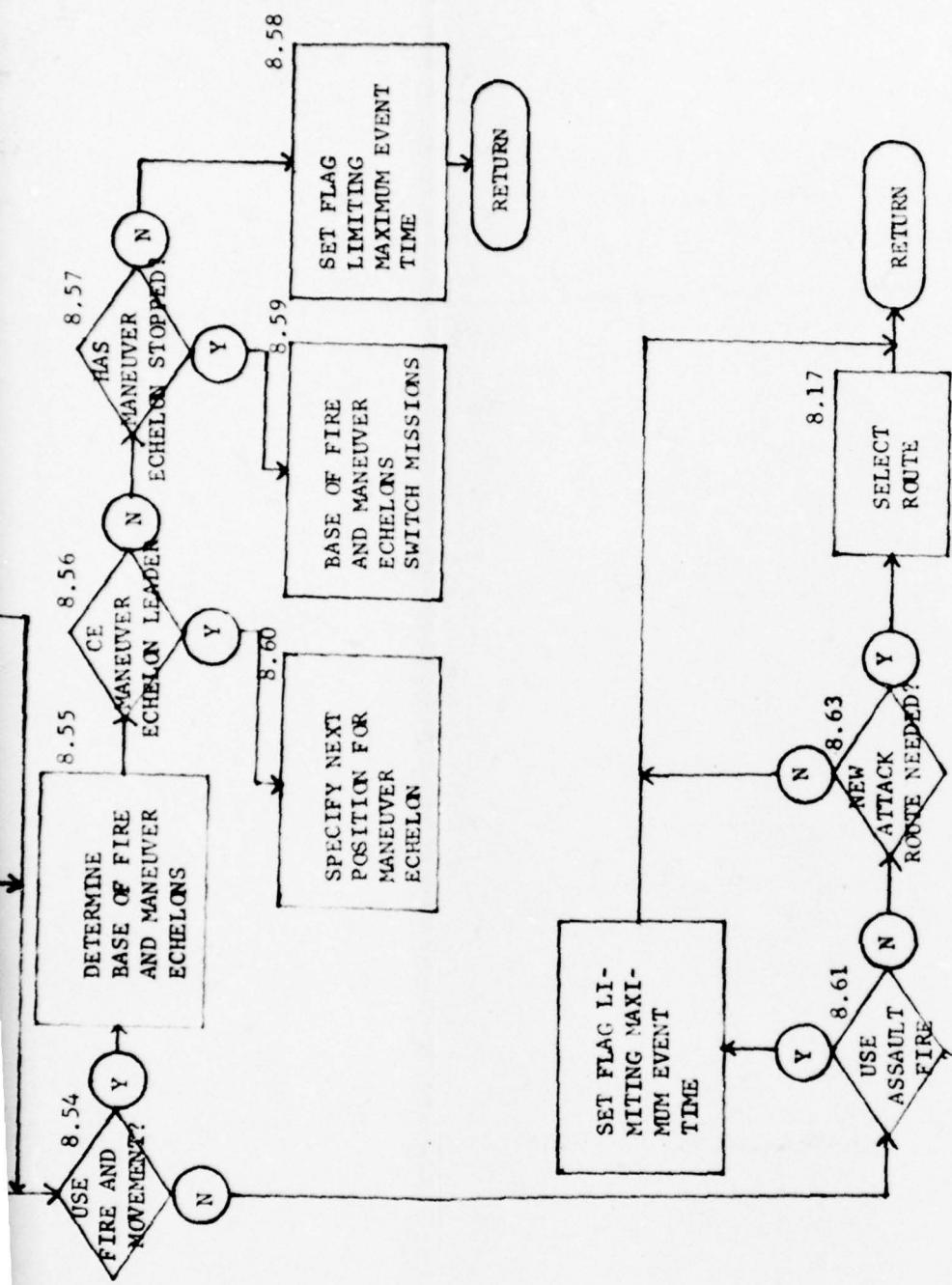
FIRE CONTROLLER (continued)

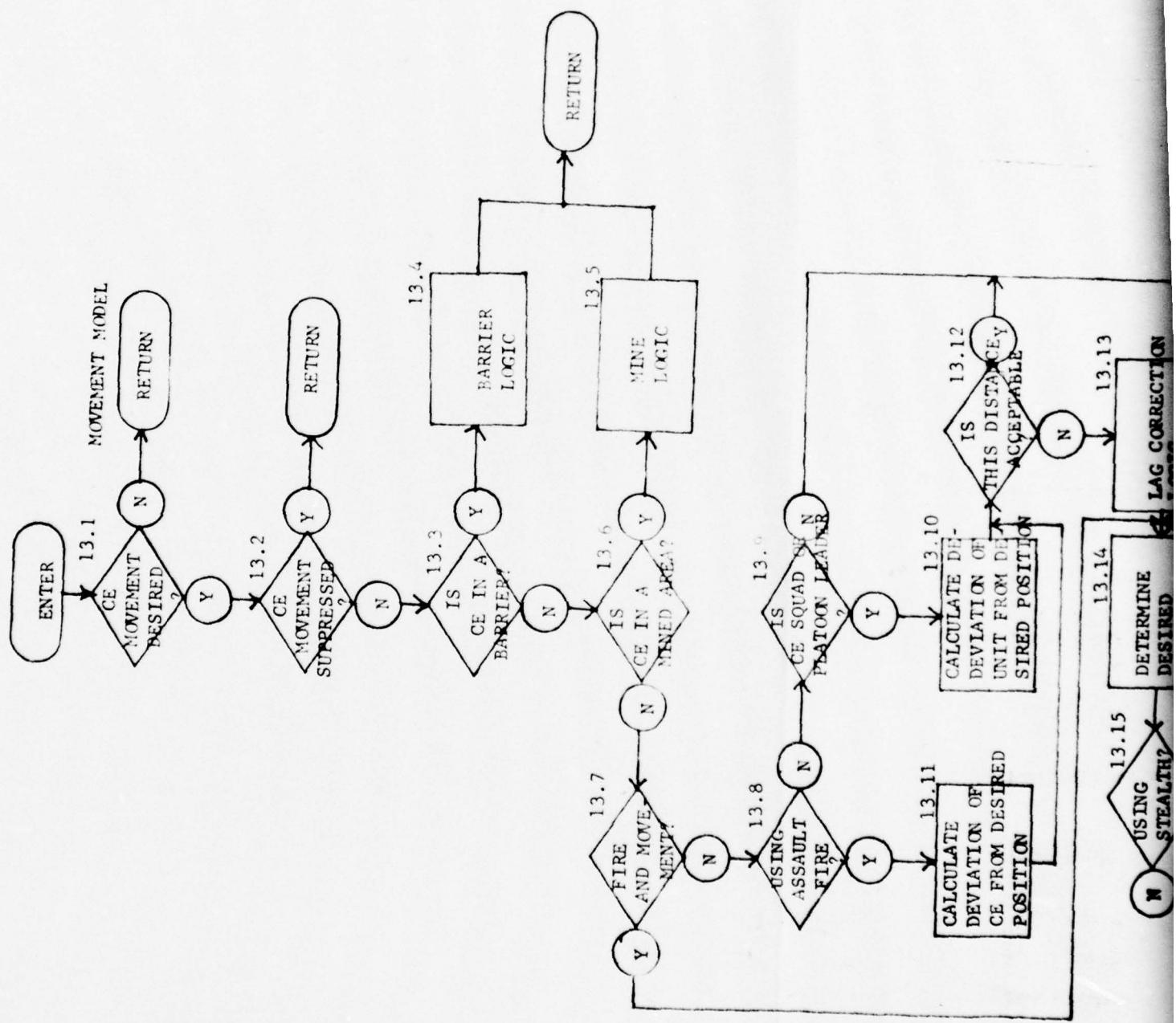


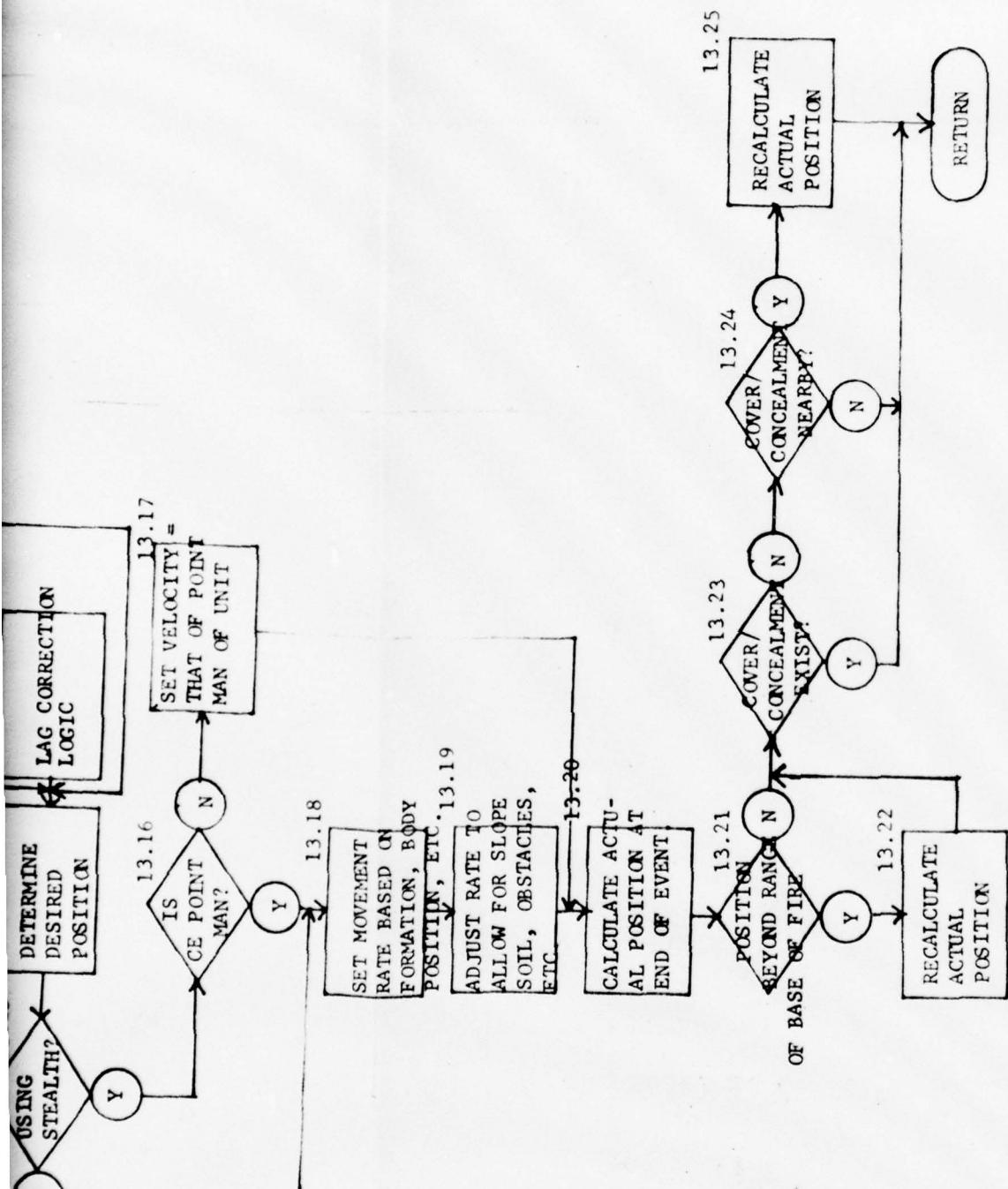


ATTACK SUBMODEL

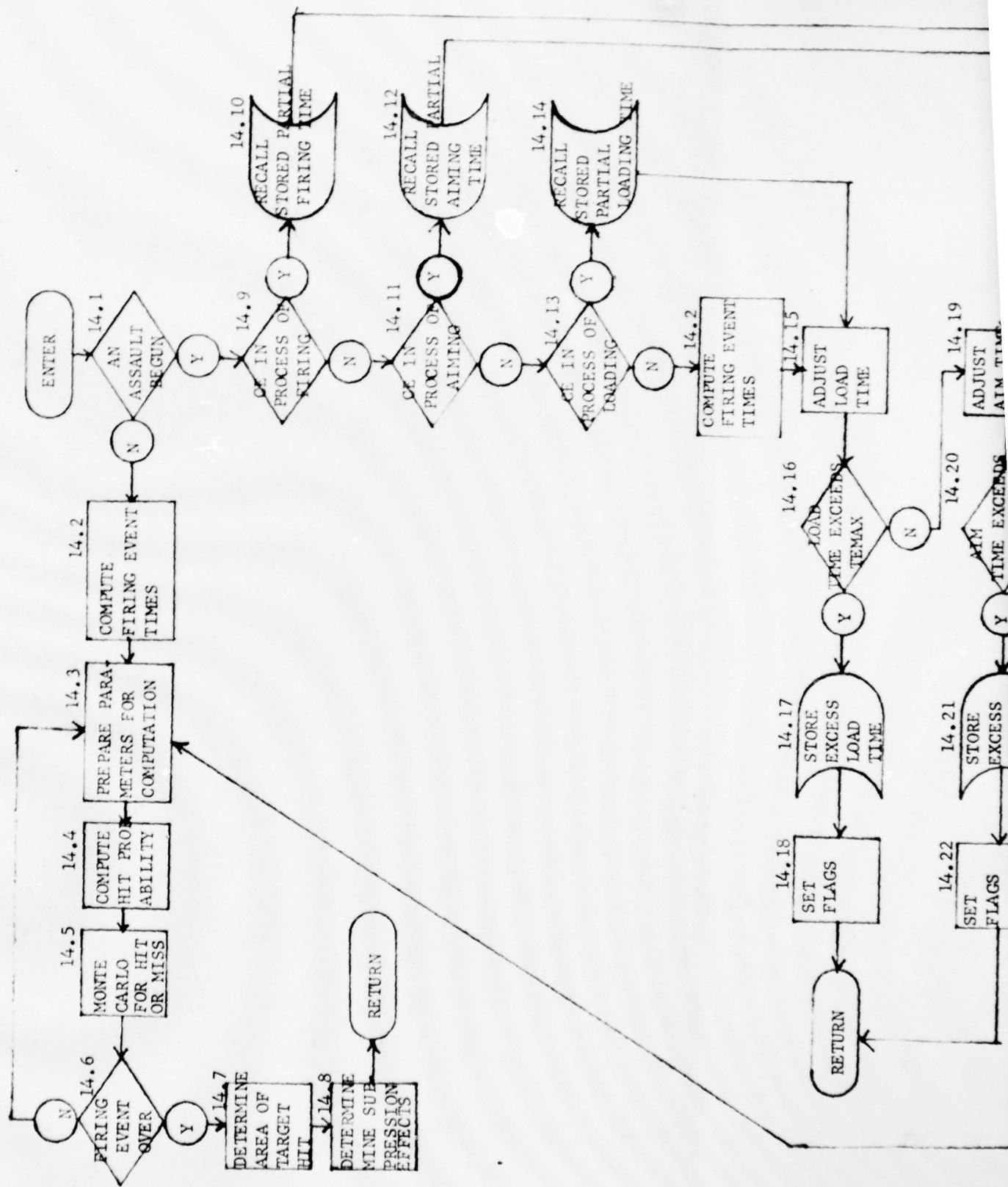


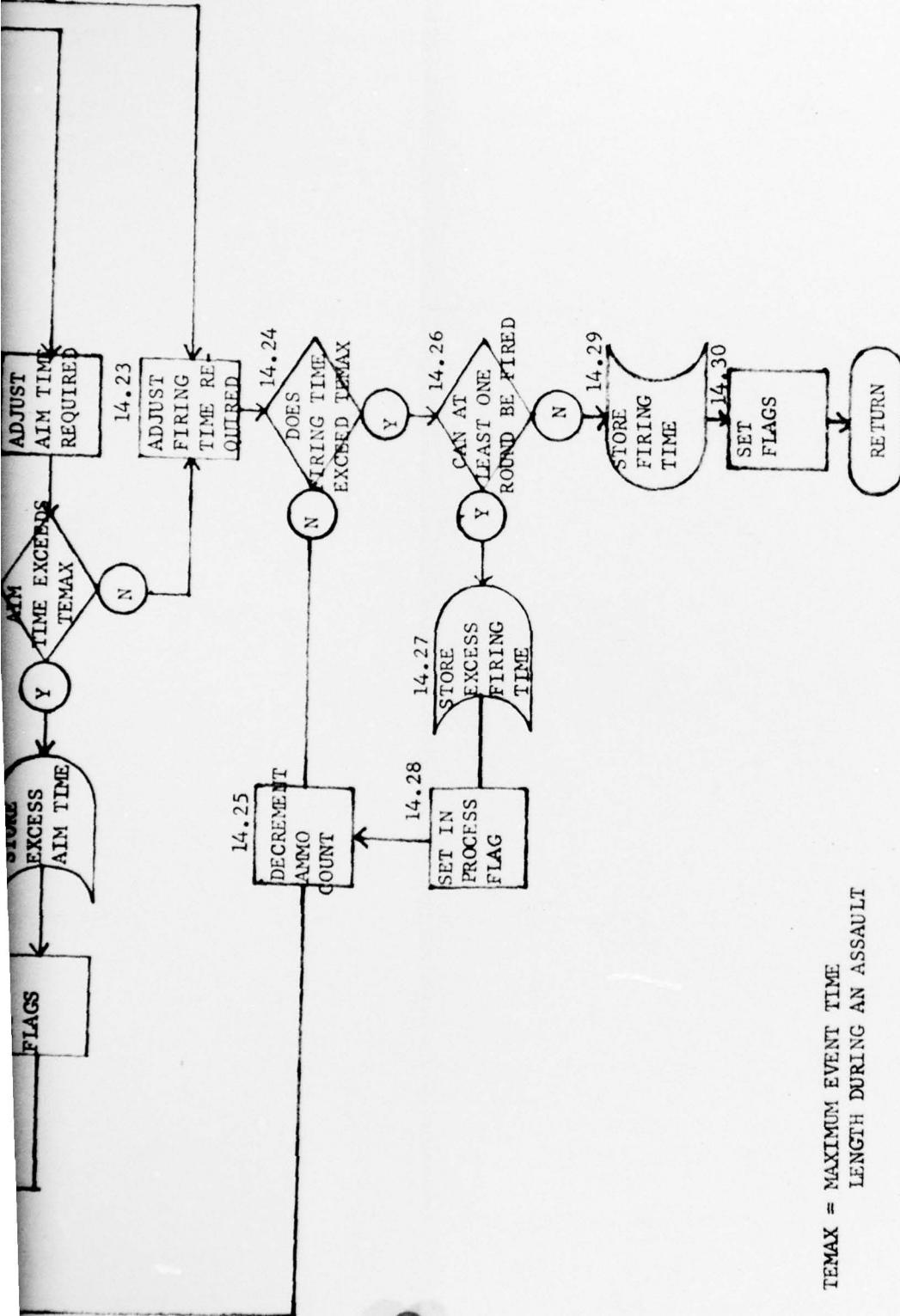






FIRING MODEL

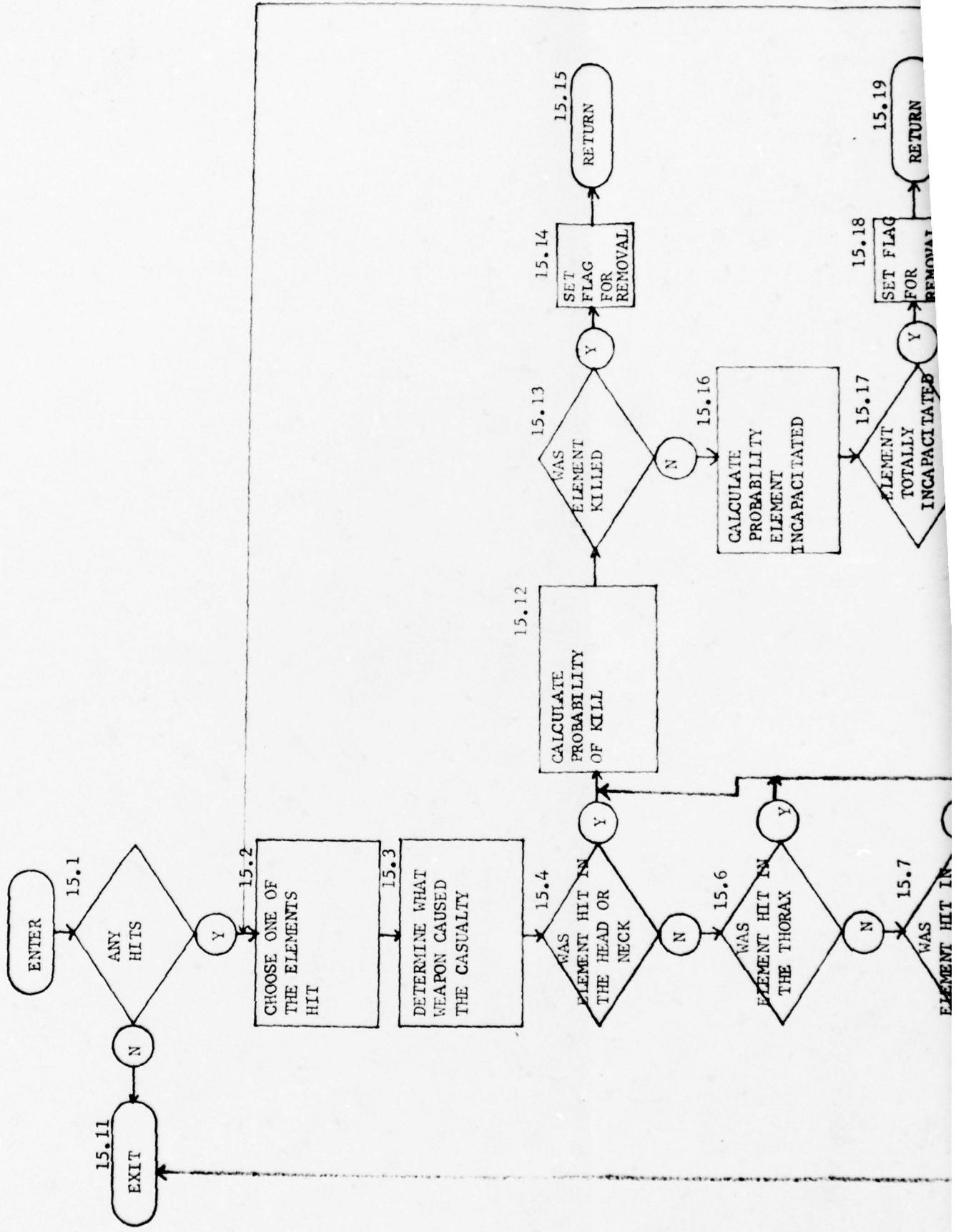


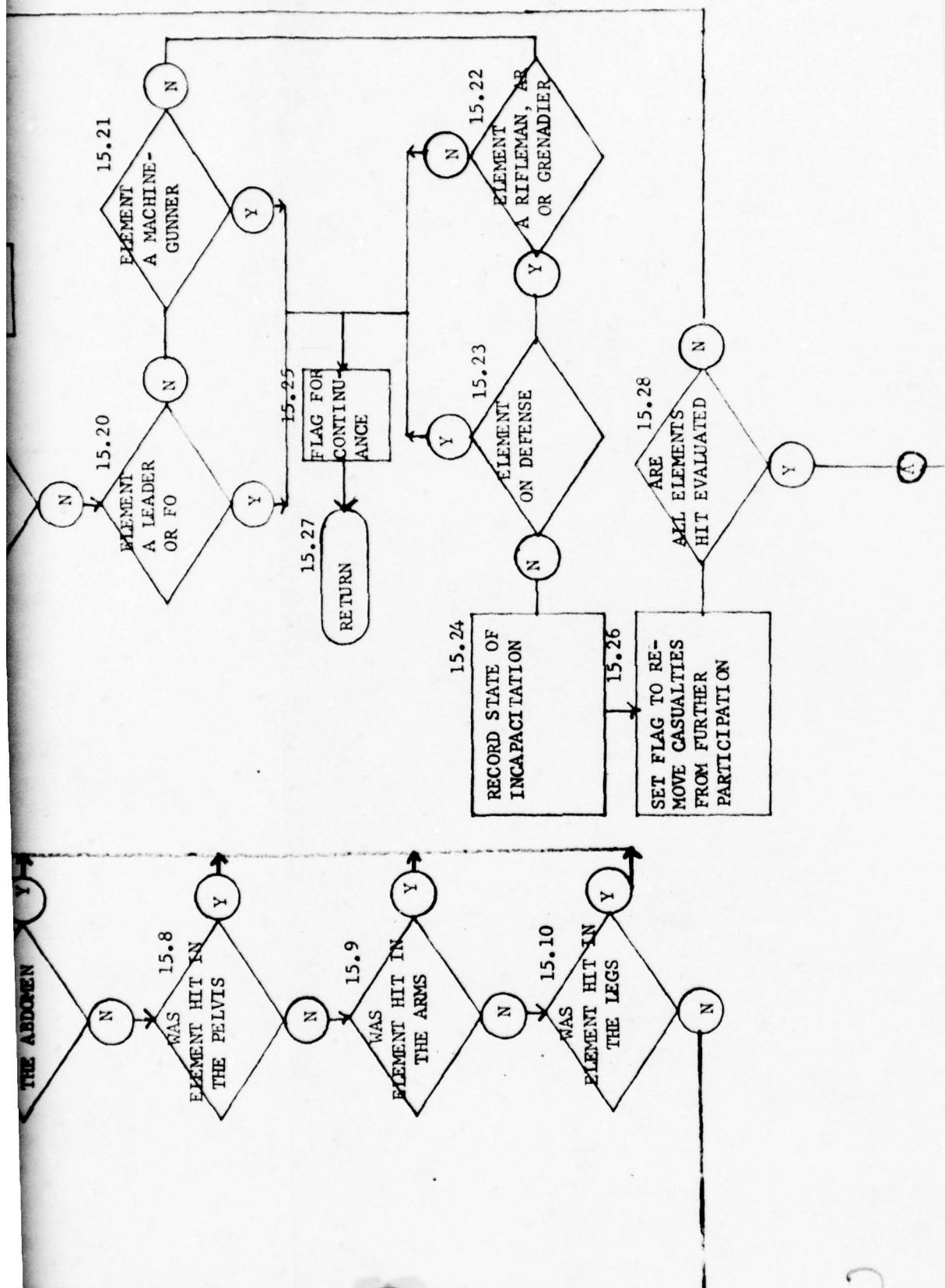


TEMAX = MAXIMUM EVENT TIME  
LENGTH DURING AN ASSAULT

2

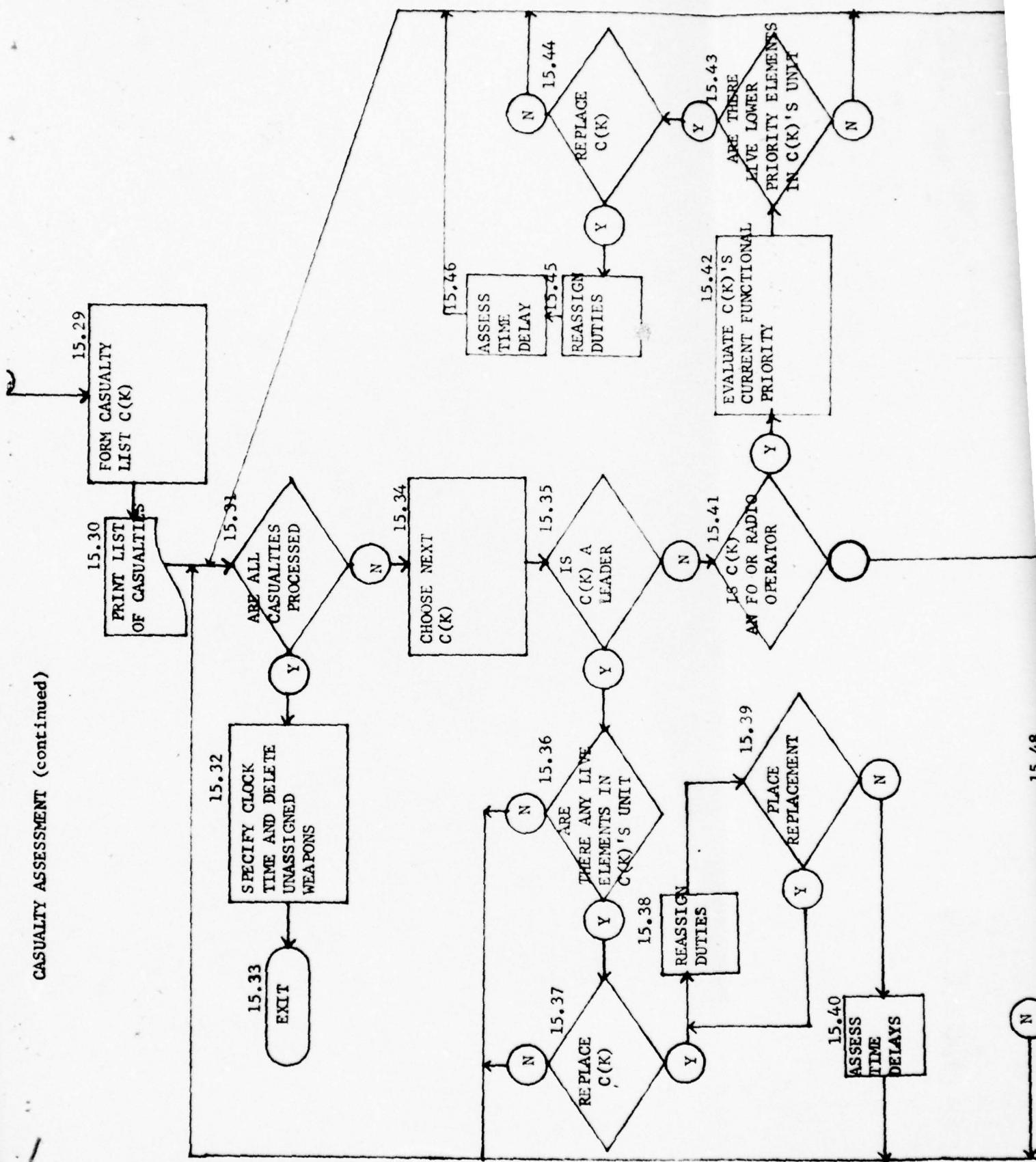
CASUALTY ASSESSMENT

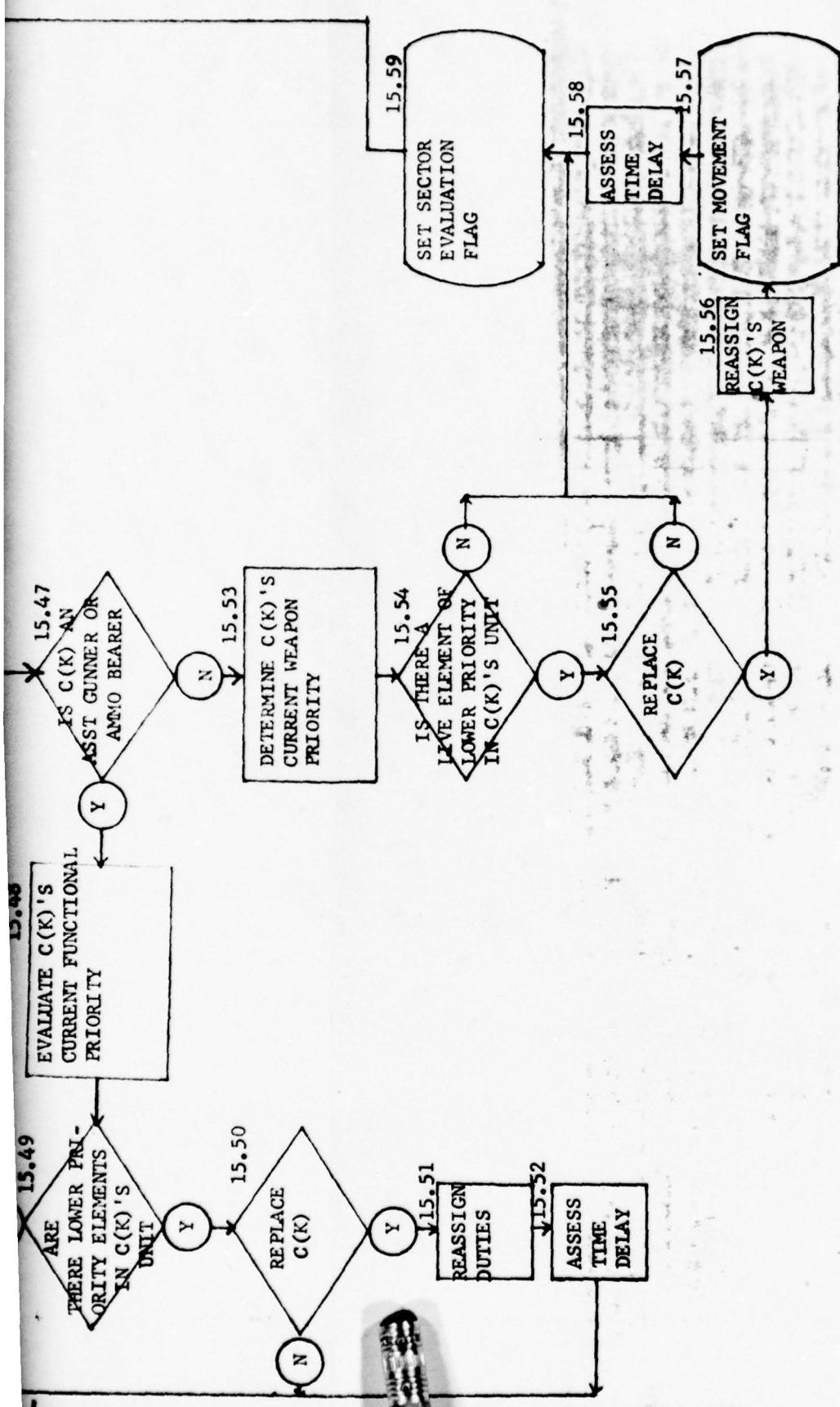




2

## CASUALTY ASSESSMENT (continued)





USACDCINA INPUTS

INFANTRY AGENCY

0900-0930 - 17 June 1971

IN THE FOLLOWING PRESENTATION I WILL ADDRESS THOSE PORTIONS OF THE ASARS II INPUT DATA COLLECTION PLAN PRESENTED YESTERDAY THAT HAVE BEEN COMPLETED PRIOR TO 12 JUNE 1971.

REFERENCE TO THIS PLAN WOULD INDICATE THAT THE FIRST INPUT REQUIRED ADDRESSING OF THE SCOPE OF THE EFFORT.

SLIDE 1 ON

THIS SLIDE PRESENTS THOSE AREAS IN QUESTION.

I WILL LEAVE THIS SLIDE ON THE SECOND VIEWGRAPH AS I DISCUSS EACH OF THESE INDIVIDUALLY.

APPROPRIATE DIRECTIVES DEFINE THE INTENSITIES OF CONFLICT AS SHOWN ON THIS SLIDE.

SLIDE 2 ON

PAUSE

SLIDE 2 OFF

THE GEOGRAPHIC CONSIDERATIONS ARE SET FORTH IN THE STUDY DIRECTIVE.

SLIDE 3 ON

AS GERMANY, KOREA AND THAILAND. YOU MAY NOTICE THAT IRAN HAS BEEN DELETED FROM THE LIST PRESENTED IN ASARS I.

SLIDE 3 OFF

THE NEXT AREA IS COMBAT OPERATIONS.

SLIDE 4 ON

AGAIN, THESE OPERATIONS ARE SPECIFIED IN THE STUDY DIRECTIVE.

SLIDE 4 OFF

IF WE TAKE ALL THREE OF THESE ELEMENTS WITHIN THE SCOPE AND INTER-  
RELATE THEM WE COULD REPRESENT THIS ACTION BY A CUBE.

SLIDE 5 ON

AS YOU CAN QUICKLY CALCULATE, THIS COMBINATION RESULTS IN TWENTY SEVEN  
POSSIBLE DISTINCT SIMULATION ENVIRONMENTS. COUPLE WITH THIS THE NECESSITY  
TO CONTROL TWO SIDES OF A BATTLE, WE ARRIVE AT FIFTY FOUR ACTIONS--AND SO  
ON TO VIRTUALLY INFINITE POSSIBLE COMBINATIONS. AS YOU CAN SEE THERE WAS  
A NEED TO LIMIT THE SCOPE OF THIS ENDEAVOR.

SLIDE 5 OFF

BY ASSIGNING THE CRITERIA OF REALISTIC ENVIRONMENT AND FUTURE ADAPTABILITY  
TO OTHER GEOGRAPHIC AREAS IN A VARIETY OF INTENSITIES OF CONFLICT, THE FOLLOWING  
SCOPE HAS BEEN ESTABLISHED FOR THE ASARS II SIMULATION.

SLIDE 6 ON

THERE IS ONE TERM HERE WHICH WARRANTS FURTHER EXPLANATION -- THAT IS THE  
FIRST, MID-HIGH INTENSITY SPECIFIED FOR GERMANY. THERE HAS BEEN CONSIDERABLE  
CONCERN VOICED AS TO THE LOSS OF THE SMALL ARMS IN A HIGH INTENSITY CONFLICT.  
WE HAVE RECOGNIZED THIS PROBLEM BY INDICATING THAT WE ARE INTERESTED IN A  
LEVEL OF CONFLICT THAT REALLY WILL BE FOUND AT THE JUNCTION OF THE MID AND  
HIGH LEVELS. THIS RESTRICTS THE STUDY EFFORT TO NINE LEVELS.

SLIDE 6 OFF

HAVING ESTABLISHED THE SCOPE -- REFERENCE TO THE INPUT DATA COLLECTION  
PLAN WILL REFLECT THAT THE NEXT REQUIREMENT IS TO SPECIFY THE SEASONS AND  
THE SPECIFIC MAP SHEETS TO BE ADDRESSED. I WOULD LIKE TO ADDRESS THE MAP  
SHEET QUESTIONS FIRST.

LIGHTS ON

THIS QUESTION WAS ACTUALLY RESOLVED BACK IN ASARS I BY THE DEVELOPMENT OF THE THREAT (ANNEX B) AND THE TARGET ARRAYS (ANNEX C) TO SUPPORT THE STUDY. THIS THREAT HAS BEEN APPROVED FOR USE IN ASARS II. IF I MAY DIRECT YOUR ATTENTION TO THE STAND TO YOUR LEFT, I WILL PINPOINT THE AREAS TO BE COVERED IN THE SIMULATION.

WORLD: SURROUND THE HEARTLAND

THAILAND: GENERAL

1:50,000

BLOCK

KOREA: GENERAL

1:50,000

BLOCK

GERMANY: GENERAL

1:50,000

BLOCK

1:6250

GENTLEMEN, THIS NEXT DROP I AM ABOUT TO DISCUSS IS CLASSIFIED SECRET NOFORN.

TARGET ARRAY DROP

DISCUSS

A SIMILAR ARRAY HAS BEEN DEVELOPED FOR EACH OF THE AREAS PRESENTED EARLIER. THIS, THEN, SPECIFIES OUR MAP SHEET COVERAGE REQUIRED FOR THE AREA.

THE SECOND INPUT REQUIRED FOR THE AREA OF OPERATION WAS THE SEASON. AGAIN, REFERENCE TO THE ASARS I STUDY RESULTS IN THE SPECIFICATION OF IDEAL WEATHER FOR THE AREAS IN QUESTION: THAT IS, GERMANY (SPRING, SUMMER, FALL); KOREA (SUMMER); AND THE DRY SEASON IN THAILAND. A DEEPER ANALYSIS OF THE IMPACT OF THE SEASON ON THE SMALL ARMS REVEALS THE FOLLOWING INTERESTING DATA:

SLIDE 7 ON

THESE FIGURES REFLECT A POSSIBLE OVERSIMPLIFICATION OF THE AREA OF OPERATIONS WHICH MAY HAVE BEEN INTRODUCED BY FAILURE TO ADDRESS WINTER IN EITHER GERMANY OR KOREA. BASED ON THESE INITIAL DATA AND THE OPINED IMPACT OF SEASON ON MOBILITY, ETC., IT IS PROPOSED THAT THE GERMANY ENVIRONMENT BE EXPANDED TO INCLUDE THE WINTER SEASON.

SLIDE 7 OFF

THERE NOW REMAINS TO BE DISCUSSED THE MEASURES OF EFFECTIVENESS TO BE APPLIED IN ASARS II. I WOULD LIKE TO POSTPONE DISCUSSION OF THIS UNTIL THIS AFTERNOON, WHEN TIME IS SET ASIDE FOR ITS DETAILED PRESENTATION.

THIS, THEN, CONCLUDES THIS PORTION OF THE BRIEFING. I WILL BE FOLLOWED BY \_\_\_\_\_ FROM SYSTEMS ANALYSIS GROUP WHO WILL DISCUSS THE APPLICATION OF THE INPUT WE HAVE PRESENTED THUS FAR AND EFFORTS TO DATE TO SATISFY THEIR RESPONSIBILITY IN THE INPUT GENERATION.

SCOPE

LEVEL OF CONFLICT.

GEOGRAPHICAL AREA OF COMBAT.

COMBAT OPERATIONS.

CONFFLICT INTENSITIES

LOW, TYPE II - STABILITY OPERATIONS INVOLVING U.S. ADVICE AND COMBAT SUPPORT TO INDIGENOUS OR ALLIED FORCE.

LOW, TYPE I - STABILITY OPERATIONS INVOLVING ACTION BY U.S. COMBAT FORCES.

MID - CONVENTIONAL WAR

HIGH - NUCLEAR WAR, OR THREAT OF NUCLEAR WAR

GEOGRAPHIC AREAS

GERMANY

KOREA

THAILAND

4-2

4-2

COMBAT OPERATIONS

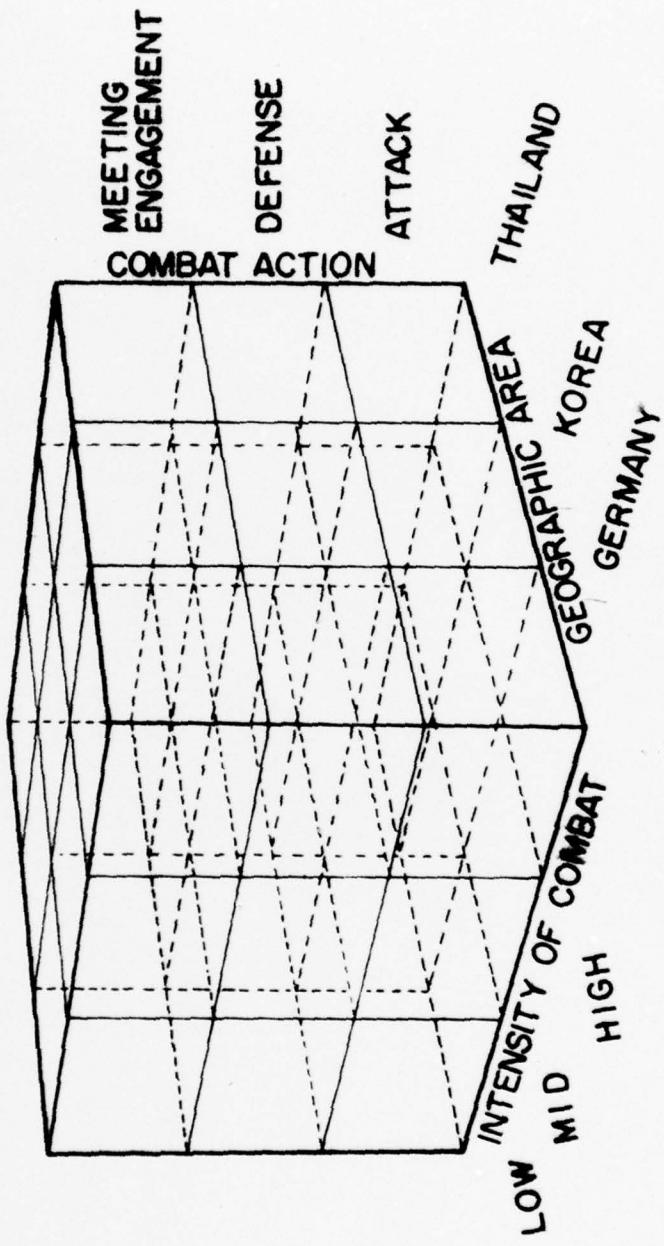
ATTACK

DEFENSE

MEETING ENGAGEMENT

44

## THE CUBE OF THE SCOPE



27 POSSIBLE SITUATIONS

<u>SCOPE FOR ASARS II SIMULATION</u>	<u>INTENSITY OF CONFLICT</u>	<u>GEOGRAPHIC AREA</u>	<u>COMBAT OPERATIONS</u>
	HIGH/MID	GERMANY	ATTACK DEFENSE MEETING ENGAGEMENT
	MID	KOREA	ATTACK DEFENSE MEETING ENGAGEMENT
	LOW	THAILAND	ATTACK DEFENSE MEETING ENGAGEMENT

EFFECTS OF WEATHER ON SMALL ARMS

M16A1

	1.3/1000 RDS	3.8/1000
0°	3.9	8.2
-20°	16.6	11.2
-40°		

STOPPAGES PER 1000 ROUNDS

11-7

USACDCSAG INPUTS

SYSTEMS ANALYSIS GROUP

0930-0950 - 17 June 1971

During this presentation Systems Analysis Group discussed the application of the input data developed by Infantry Agency. It was pointed out that a request for digital data generation on three map sheets for ASARS II had been submitted through channels.

INPUTS UNDER DEVELOPMENT

INFANTRY AGENCY

1000-1030 - 17 June 1971

THE PURPOSE OF THIS BRIEFING IS TO PRESENT A SAMPLE OF SOME OF THE ONGOING EFFORTS AT INPUT DEVELOPMENT. THIS DISCUSSION WILL ADDRESS THE SUBJECTS LISTED ON THIS NEXT SLIDE.

SLIDE 1 ON

I WILL KEEP THIS SLIDE ON THE SECOND VIEWGRAPH WHILE I DISCUSS EACH SEPARATELY.

THE FIRST AREA WILL BE REFORM.

SLIDE 2 ON

THE PURPOSE AND MEANING OF REFORM ARE SHOWN ON THIS SLIDE. THE EXPERIMENTAL DATA RESULTING FROM THIS SMALL SCALE EXPERIMENT WILL ASSIST IN THE ASSIGNMENT OF CRITERIA FOR ENGAGEMENT OF TYPE TARGETS BY SELECTED ELEMENTS OF A SQUAD IN THE ASARS SIMULATION.

THIS SMALL SCALE EXPERIMENT, LIKE THE ONE I WILL DISCUSS NEXT, WAS THE SUBJECT OF A COORDINATION MEETING THE FIRST WEEK IN JUNE BETWEEN CDCEC, SAG AND THE INFANTRY AGENCY. A MEMORANDUM OF UNDERSTANDING ON THIS EXPERIMENT IS BEING PREPARED BY CDCEC AND A DESCRIPTIVE FLYER ON ITS STATUS SHOULD BE PUBLISHED SHORTLY.

SLIDE 2 OFF

THE SECOND SMALL SCALE EXPERIMENT IS TARGET ENGAGEMENT THROUGH VISUAL AND AUDIO DETECTION.

SLIDE 3 ON

THE ACRONYM AND THE PURPOSE OF THE EXPERIMENT ARE SHOWN ON THIS SLIDE. IN THE COURSE OF THE ASARS BATTLE SIMULATION DEVELOPMENT, THE NEED FOR THIS EXPERIMENTAL DATA HAS BEEN MORE CLEARLY DEFINED AND LED TO MODIFICATION OF

THE EXPERIMENT TO THE POINT THAT THE ACRONYM AND PURPOSE WOULD MORE PROPERLY BE DESCRIBED AS SHOWN ON THIS NEXT SLIDE.

SLIDE 3 OFF

SLIDE 4 ON

NOTICE THAT THE ENGAGEMENT ASPECT OF THE EXPERIMENT HAS BEEN DELETED AND THAT THE CUES ARE BOTH AUDIO AND VISUAL. THIS DATA WILL BE APPLIED IN THE TARGET DETECTION SUBROUTINE OF THE SIMULATION TO PERMIT THE INTRODUCTION OF THE COMPLETE SPECTRUM OF CUES AVAILABLE TO THE INFANTRYMAN IN HIS BATTLEFIELD ENVIRONMENT.

SLIDE 4 OFF

THERE IS SOME QUESTION, BECAUSE OF PRIORITIES, WHETHER CDCEC WILL BE ABLE TO COMPLETE THESE EXPERIMENTS PRIOR TO 1 JANUARY 1972, WHICH WAS SPECIFIED BY SAG AND INA AS THE REQUIRED COMPLETION DATE. ONE JANUARY 1972 IS THE LATEST DATE THAT THE EXPERIMENTAL RESULTS CAN BE INCORPORATED INTO THE SIMULATION, WITHOUT EXTENSIVE MODIFICATION, IF THERE IS ANY SIGNIFICANT DEVIANCE FROM EXPECTED RESULTS. IF THE RESULTS CAN BE ADEQUATELY ESTIMATED, THE FINAL DATA CAN BE PROVIDED AS LATE AS 1 MARCH FOR INCORPORATION INTO THE ASARS DATA BASE.

THE THIRD AREA I WILL DISCUSS IS SUPPRESSION. THIS IS A SUBJECT WHICH HAS BEEN THE TARGET OF MUCH CONCERN BUT UNTIL RECENTLY NOT SUCCESSFULLY DEFINED OR ITS CONTRIBUTION TO COMBAT CLEARLY IDENTIFIED.

IN PURSUIT OF THIS NEBULOUS AREA, ARPA LET A CONTRACT IN SEPTEMBER 1970 TO DEFENSE SCIENCE LABORATORIES (LITTON SYSTEMS) WHICH IS BEING MONITORED BY USASASA. THE PURPOSE OF THIS CONTRACT EFFORT IS SHOWN ON THIS NEXT SLIDE.

SLIDE 5 ON

PAUSE

IN PURSUIT OF THIS OBJECTIVE, LITTON HAS COMPLETED AN EXTENSIVE LITERATURE SEARCH, REVIEW OF COMBAT FILMS AND RECORDS, QUESTIONNAIRES COMPLETED BY OVER 1,000 TEST SUBJECTS, INTERVIEWS, AND IS CURRENTLY PLANNING A SERIES OF FIELD EXPERIMENTS WHICH WILL BE CONDUCTED IN AUGUST 1971. THE CONTRACT IS PROGRAMMED FOR COMPLETION IN THE TIME FRAME DECEMBER 1971 TO FEBRUARY 1972.

SLIDE 5 OFF

USACDCINA HAS BEEN MONITORING THE DEVELOPMENT OF THIS CONTRACT CLOSELY SINCE FEBRUARY OF THIS YEAR, AND THERE APPEARS TO BE DIRECT APPLICATION OF THIS EFFORT TO THE ASARS STUDY.

INITIAL EFFORTS HAVE SUCCEEDED IN DEFINING SMALL ARMS SUPPRESSION AS SHOWN ON THIS NEXT SLIDE.

SLIDE 6 ON

PAUSE

SLIDE 6 OFF

PRELIMINARY ANALYSIS OF A SMALL SAMPLE OF THE QUESTIONNAIRES COMPLETED TO DATE INDICATES THAT DIRECT AND MEASURABLE RELATIONSHIPS BETWEEN VOLUME OF FIRE, ACCURACY AND TYPE OF WEAPON OR WEAPON MIX CONDUCTING THE FIRE TO SUPPRESSION DO EXIST. A SAMPLE OF THE SMALL ARMS FIRE CHARACTERISTICS ADDRESSED BY THE QUESTIONNAIRES IS PRESENTED ON THIS NEXT SLIDE.

SLIDE 7 ON

OF THESE, THE THREE CIRCLED CHARACTERISTICS HAVE APPEARED TO BE DOMINANT.

PAUSE

SLIDE 7 OFF

INITIAL LISTINGS OF A GROUP'S PERCEIVED "DANGEROUSNESS" OF VARIOUS WEAPONS SYSTEMS UNDER ATTACK AND DEFENSE CONDITIONS HAS BEEN FORMULATED.

SLIDE 8 ON

THE SCALE VALUES ON THE RIGHT HAND SIDE OF THIS VIEWGRAPH INDICATE RELATIVE VALUES AND ARE NOT INTENDED TO REFLECT ANYTHING ELSE.

SLIDE 8 OFF

EVALUATION OF INITIAL RESULTS HAS PERMITTED LITTON TO CREATE A SIX POINT ORDINAL SCALE TO MEASURE SUPPRESSION.

SLIDE 9 ON

THIS SCALE IS SUITABLE FOR THE PURPOSE OF THE CONTRACT; HOWEVER, IT IS NOT COMPATIBLE FOR INTRODUCTION INTO THE ASARS SIMULATION. TO FACILITATE ITS APPLICATION IN ASARS, THE ORDINAL SCALE MUST BE TRANSFORMED TO AN INTERVAL SCALE.

SLIDE 9 OFF

IT APPEARS THAT THE ONLY MEANS OF CREATING THIS TRANSFORMATION IS THROUGH THE APPLICATION OF MILITARY JUDGMENT. WITH THIS GOAL IN MIND, THE INFANTRY AGENCY UNDERTOOK THE CREATION OF THIS TRANSFORMATION AND HAS BEEN SUCCESSFUL IN CREATING THE FOLLOWING.

SLIDE 10 ON

THE NUMERICAL RATING IN THE RIGHT HAND COLUMN IS THE WEIGHTING OR DEGREE OF SUPPRESSION WHICH HAS BEEN ASSIGNED TO THE VERBAL DESCRIPTION AND CORRESPONDING ORDINAL LETTER ON THE LEFT. FOURTEEN OFFICERS AND ENLISTED MEN SELECTED FROM THE INFANTRY AGENCY WHO HAD SIMILAR LEVELS OF EXPERIENCE AS THOSE CONSTITUTING THE QUESTIONNAIRE POPULATION WERE USED FOR THIS EXPERIMENT. THE DELPHI TECHNIQUE (REPLICATIONS) WAS USED TO DEVELOP THE EXPECTED CENTRAL TENDENCIES OF THE ASSIGNMENT. NOTICE THAT AN ADDITIONAL DESCRIPTIVE STATE ( $E_1$ ) HAS BEEN INCORPORATED AS A RESULT OF THAT FIRST DELPHI SAMPLE.

I WILL EXPLAIN BRIEFLY HOW THIS TRANSFORMATION WAS ARRIVED AT.

SLIDE 11 ON

THIS FIRST SLIDE SHOWS THE RESULTS OF THE FIRST SET OF QUESTIONNAIRES. THIS INFORMATION WAS GIVEN TO THE TEST SUBJECTS, AND THEY WERE ASKED TO REASSESS THEIR EARLIER ASSIGNMENTS. THE RESULT WAS

FLIP 1 SLIDE 11 ON

A PRONOUNCED NARROWING OF THE DISTRIBUTION AND SURFACING OF THE EXPECTED CENTRAL TENDENCY. THE LAST REPLICATION OF THIS DELPHI TECHNIQUE HAS RESULTED IN THE FINAL DATA

FLIP 2 SLIDE 11 ON

AND IS DEPICTED ON THIS SLIDE. DURING THE CONDUCT OF THIS EXPERIMENT ONE INDIVIDUAL APPARENTLY CONTINUED TO ASSIGN THE SAME VALUES IN ALL THREE PHASES.

SLIDE 11 OFF

IF HIS RESULTS ARE INCLUDED, WE GET THE FOLLOWING PLOT.

SLIDE 12 ON

THIS INFORMATION WILL BE PROVIDED TO LITTON TO PERMIT ITS INCORPORATION INTO THEIR CONTRACT EFFORT. WITHIN THE SCOPE OF THEIR CONTRACT, LITTON WILL COMPARE THE ORDINAL AND INTERVAL SCALE AND DETERMINE WHAT RELATION, IF ANY, AND IF THE USE OF ONE OR THE OTHER HAS ANY SIGNIFICANT IMPACT ON THEIR RESULTS.

WE AT THE INFANTRY AGENCY ARE NOT HAPPY WITH THE SMALL POPULATION OF FOURTEEN SUBJECTS USED IN SHOWING THIS RELATION. TO OVERCOME THIS PROBLEM, WE ARE IN THE PROCESS OF EXPANDING THIS POPULATION TO APPROXIMATELY 1,000 BY ADMINISTERING THE QUESTIONNAIRE TO THE CAREER COURSE STUDENTS AT FORT BENNING AND THE COMMAND AND GENERAL STAFF COLLEGE STUDENTS AT FORT LEAVENWORTH, APPLYING THE SAME CRITERIA FOR RESPONDENTS. IT IS NOT EXPECTED THAT SIGNIFICANT VARIATION FROM THE CURRENT ASSIGNED VALUES WILL BE EXPERIENCED.

SLIDE 12 OFF

SLIDE 10 OFF

SLIDE J-1 ON

THE NEXT AREA I WOULD LIKE TO DISCUSS IS THE PROBLEM OF MOVING TARGETS. EXTENSIVE DATA IS AVAILABLE ON THE PROBABILITY OF HIT AGAINST STATIONARY TARGETS. SIMILAR DATA FOR ENGAGEMENT OF MOVING HUMAN TARGETS IS VIRTUALLY NONEXISTENT. THE US ARMY INFANTRY BOARD HAS RECENTLY COMPLETED A MOVING TARGET RANGE HERE AT FORT BENNING. EFFORTS ARE CURRENTLY UNDERWAY TO DEVELOP  $P_H$  DATA AGAINST MOVING TARGETS ON THIS RANGE FOR M16 AND M14 RIFLES. IT IS ANTICIPATED THAT UPON DETERMINATION OF THESE VALUES - A MATHEMATICAL TRANSFORMATION AS A FUNCTION OF TARGET RANGE AND SPEED CAN BE DEVELOPED FOR THE M16 RIFLE RELATING THE  $P_H$  FOR STATIONARY TARGETS AND THE  $P_H$  FOR MOVING TARGETS.

SLIDE 13 ON

THIS SLIDE PRESENTS RESULTS OF TEST RUNS ON THE MOVING TARGET RANGE. THE TRANSFORMATION AT THE BOTTOM OF THE SLIDE WOULD THEN BE TESTED WITH THE M14 RIFLE AND, IF THE TRANSFORMATION APPEARS VALID, IT WILL BE APPLIED TO DEVELOP  $P_H$  DATA ON MOVING TARGETS FROM THE EXISTING DATA ON STATIONARY TARGETS FOR ALL WEAPONS AS A FIRST APPROXIMATION UNTIL TEST DATA COULD BE GENERATED.

SLIDE 13 OFF

THE LAST AREA UNDER THE GROUPING OF INPUTS UNDER DEVELOPMENT THAT I WILL DISCUSS IS THE ACQUISITION OF RELIABILITY DATA FOR THE WEAPONS TO BE EMPLOYED IN THE SIMULATION. TO FACILITATE THIS DISCUSSION, I WOULD LIKE TO FIRST PRESENT THESE DEFINITIONS OF TERMS:

SLIDE 14 OFF

INITIAL RESEARCH EFFORT BY THE MAINTENANCE AGENCY IN PURSUIT OF THIS DATA HAS SURFACED A PRONOUNCED LACK OF STATISTICALLY SIGNIFICANT DATA. IF SOURCES CANNOT BE LOCATED SOON, EXPERIMENTATION WILL BE THE ONLY RE COURSE TO CREATING THE DATA BASE NECESSARY.

THIS CONCLUDES THIS PORTION OF THE PRESENTATION. ARE THERE ANY QUESTIONS?

INPUTS UNDER DEVELOPMENT

I                   SMALL SCALE EXPERIMENTS TO BE CONDUCTED BY CDCEC

A - RELATIONSHIP BETWEEN THE FIREPOWER OF RIFLES  
AND MACHINEGUNS (REFORM)

B - TARGET ENGAGEMENT THROUGH VIDEO AND AUDIO  
DETECTION (TEVAD)

II                   SUPPRESSION

III                   $P_h$  FOR MOVING TARGETS

IV                  RELIABILITY DATA

RELATIONSHIP BETWEEN THE FIREPOWER OF RIFLES

AND MACHINEGUNS

(REFORM)

PURPOSE

TO PROVIDE USACDCINA EXPERIMENTAL DATA TO DETERMINE  
THE RELATIONSHIP BETWEEN THE FIREPOWER OF THE M60 MACHINEGUN  
AND THE M16A1 RIFLE FOR INPUT TO THE ARMY SMALL ARMS REQUIREMENTS  
STUDY.

TARGET ENGAGEMENT THROUGH VISUAL

AND AUDIO DETECTION

(TEVAD)

PURPOSE

TO PROVIDE USACDCINA EXPERIMENTAL DATA TO  
DETERMINE THE RIFLE SQUAD'S ABILITY TO ACQUIRE  
CONCEALED ENEMY POSITIONS, GIVEN SOME IMMEDIATE  
VISUAL AND/OR AUDIO CUE.

5-7

2

17  
1

TARGET ACQUISITION THROUGH VISUAL  
AND AUDIO DETECTION  
(TAVAD)

PURPOSE

TO PROVIDE USACDCINA EXPERIMENTAL DATA TO DETERMINE  
THE RIFLE SQUAD'S ABILITY TO ACQUIRE CONCEALED ENEMY POSITIONS  
GIVEN SOME IMMEDIATE VISUAL AND AUDIO CUES.

PURPOSE OF SUPPRESSION CONTRACT

IDENTIFY OBJECTIVE RELATIONSHIPS BETWEEN SMALL ARMS

CHARACTERISTICS AND EFFECTIVENESS IN SUPPRESSIVE

FIRE.

SMALL ARMS SUPPRESSION

A STATE OF RELATIVE INEFFECTIVENESS OR INCAPACITATION

OF THE INDIVIDUAL SOLDIER WHICH IS A FUNCTION OF PSYCHOLOGICAL

FACTORS, AND WHICH IS EITHER INITIATED OR MAINTAINED BY SMALL

ARMS FIRE.

SAMPLE OF SMALL ARMS FIRE CHARACTERISTICS

- VOLUME OF FIRE PER UNIT TIME. • VISUAL CUES.
- CYCLIC RATE PER BURST. • UNIQUENESS OF SOUND (e.g., ABILITY OF ENEMY TO CONSISTENTLY IDENTIFY THE SOUND WITH A PARTICULAR WEAPON.)
- ACOUSTIC SIGNATURE (VOLUME). •
- ACOUSTIC TONE. •
- ACCURACY OF FIRE. • ACTUAL LETHALITY OF PROJECTILES.
- PERCEIVED LETHALITY OF PROJECTILES. • SIGNATURE CUES AT THE WEAPON (e.g., MUZZLE BLAST).
- DISTANCE OF PASSING OR IMPACTING PROJECTILES FROM THE SOLDIER. • INFILIGHT VISIBILITY OF PROJECTILES (e.g., TRACER).
- MANNER OF DISTRIBUTION OF FIRE. •
- COORDINATION OF FIRE WITH SUPPRESSIVE FIRE FROM OTHER TYPES OF WEAPONS. • IMPACT SIGNATURE (e.g., DEBRIS OR DUST THROWN UP BY IMPACTING ROUNDS.)
- WEAPON'S BASIC LOAD. • TIME TO RELOAD.
- RELIABILITY.

PERCEIVED DANGEROUSNESS

<u>FORM A (DEFENSE)</u>	<u>WEAPON</u>	<u>SCALE VALUE</u>
	.50 CALIBER MACHINEGUN	100
	LAUNCHED HIGH EXPLOSIVE GRENADE	66
	M60, 7.62mm MACHINEGUN	66
	CHICOM (RPD) MACHINEGUN	46
	HIGH EXPLOSIVE HAND GRENADE	45
	M16 RIFLE	10
	AK47 ASSAULT RIFLE	5
	M14 RIFLE	0
<u>FORM B (OFFENSE)</u>		
	.50 CALIBER MACHINEGUN	100
	M60, 7.62mm MACHINEGUN	82
	CHICOM (RPD) MACHINEGUN	56
	M16 RIFLE	37
	LAUNCHED HIGH EXPLOSIVE GRENADE	35
	AK47 ASSAULT RIFLE	29
	M14 RIFLE	26
	HIGH EXPLOSIVE HAND GRENADE	0

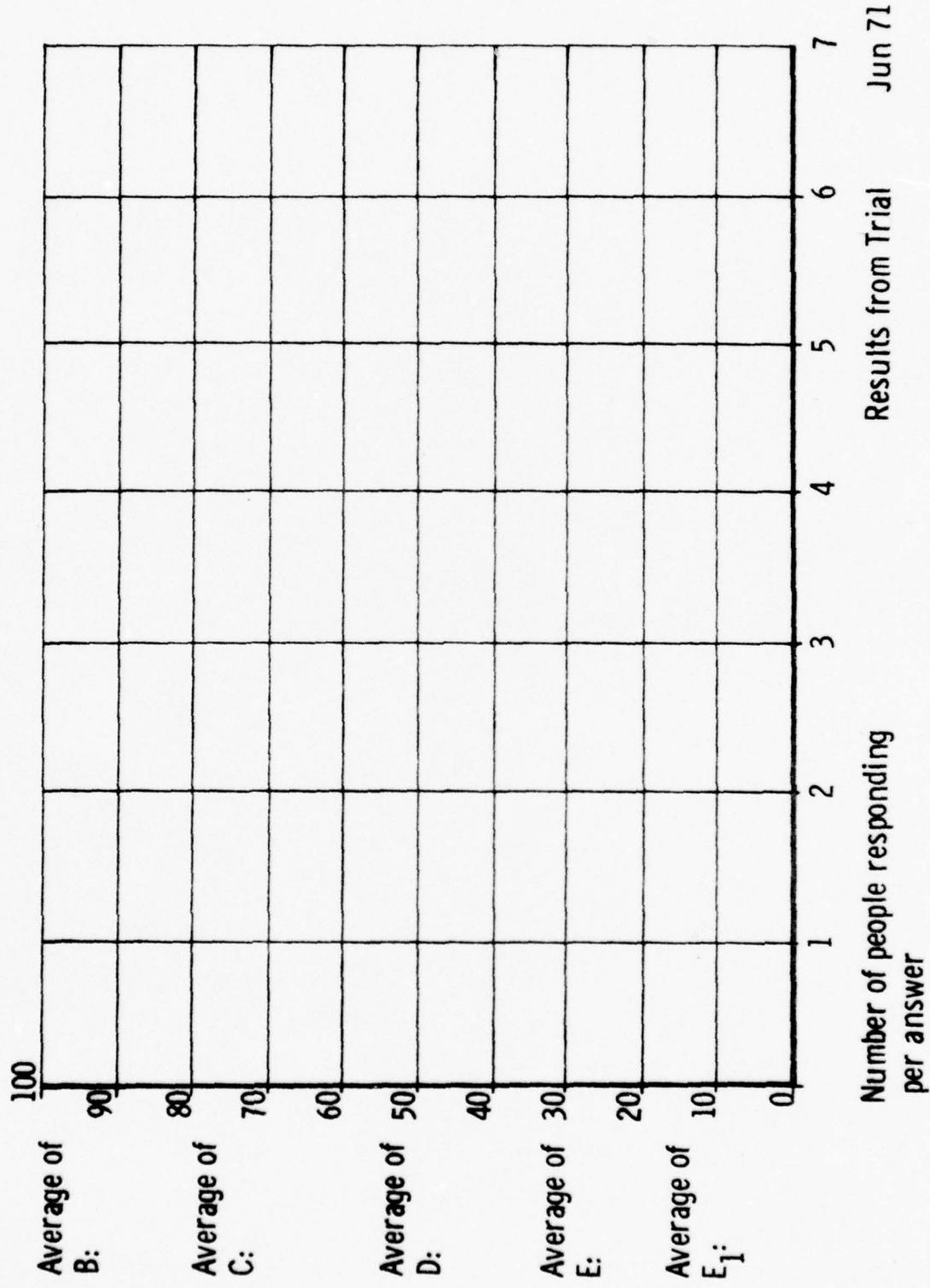
T-8

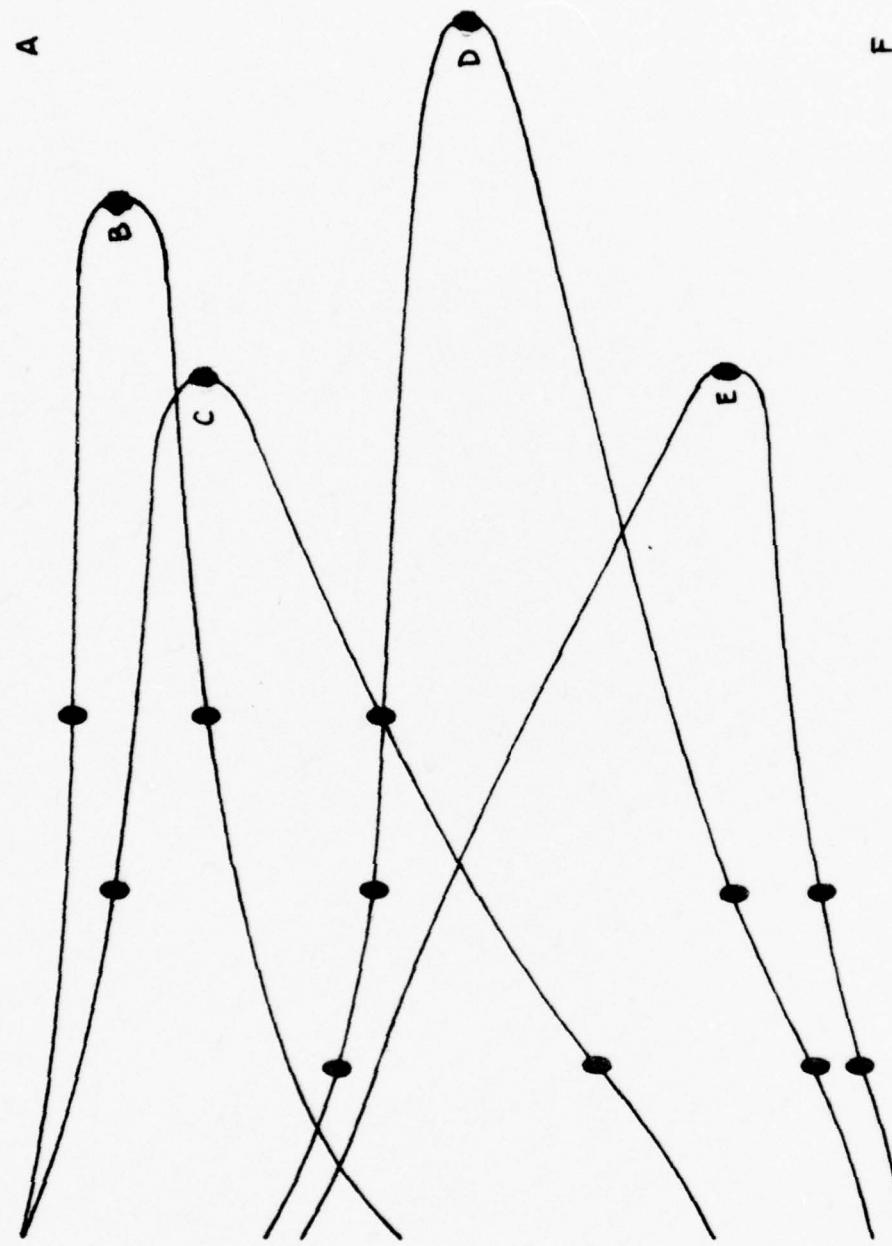
ORDINAL STATES OF SUPPRESSION

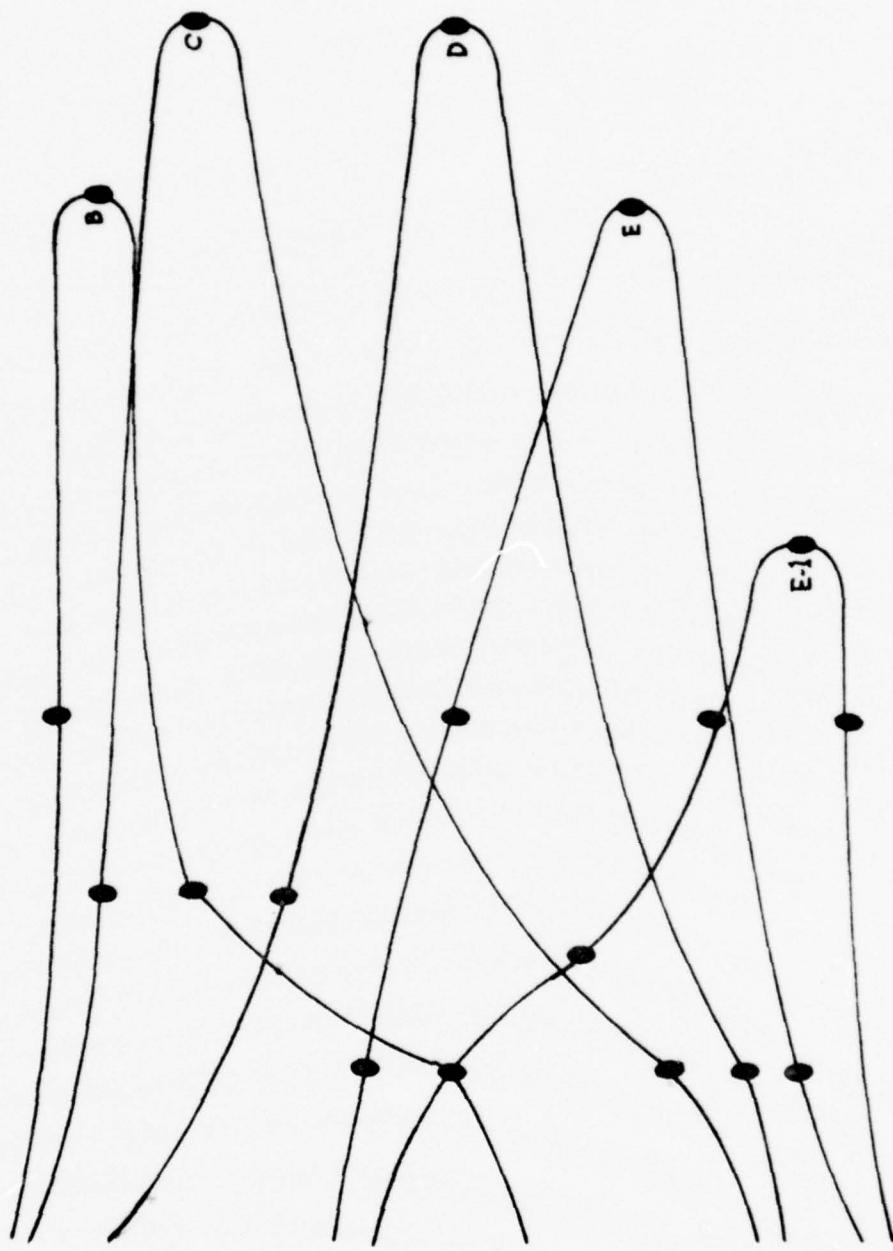
- A. TAKE COVER AS BEST AS I COULD, BUT WOULDN'T BE ABLE TO OBSERVE OR FIRE ON THE ENEMY AT ALL.
- B. TAKE COVER AS BEST AS I COULD, AND WOULD BE ABLE TO OBSERVE THE ENEMY OCCASIONALLY BUT WOULDN'T BE ABLE TO FIRE AT THE ENEMY AT ALL.
- C. TAKE COVER AS BEST AS I COULD, AND WOULD BE ABLE TO OBSERVE THE ENEMY CONTINUOUSLY BUT WOULDN'T BE ABLE TO FIRE AT THE ENEMY AT ALL.
- D. TAKE COVER AS BEST AS I COULD, AND WOULD BE ABLE TO OBSERVE THE ENEMY OCCASIONALLY AND FIRE AT THE ENEMY OCCASIONALLY.
- E. TAKE COVER AS BEST AS I COULD, AND WOULD BE ABLE TO OBSERVE THE ENEMY CONTINUALLY AND FIRE AT THE ENEMY OCCASIONALLY.
- F. WOULD CONTINUE DOING WHAT I HAD BEEN DOING BEFORE THE INCOMING FIRE AND WOULDN'T WORRY ABOUT GETTING BETTER COVER.

RESULTS OF DELPHI EXPERIMENT ON SUPPRESSION TRANSFORMATION

<u>ORDINAL SCALE</u>	<u>FINAL ASSIGNED INTERVAL SCALE</u>
A.	TAKE COVER AS BEST I CAN, BUT WOULDN'T BE ABLE TO OBSERVE OR FIRE ON ENEMY AT ALL. 100
B.	TAKE COVER AS BEST I COULD AND WOULD BE ABLE TO OBSERVE THE ENEMY OCCASIONALLY, BUT WOULDN'T BE ABLE TO FIRE AT THE ENEMY AT ALL. 90
C.	TAKE COVER AS BEST I COULD AND WOULD BE ABLE TO OBSERVE THE ENEMY CONTINUOUSLY BUT WOULDN'T BE ABLE TO FIRE AT THE ENEMY AT ALL. 75
D.	TAKE COVER AS BEST I COULD, AND WOULD BE ABLE TO OBSERVE THE ENEMY OCCASIONALLY AND FIRE AT THE ENEMY OCCASIONALLY. 50
E.	TAKE COVER AS BEST I COULD, AND WOULD BE ABLE TO OBSERVE THE ENEMY CONTINUOUSLY AND FIRE AT THE ENEMY OCCASIONALLY. 35
E <sub>1</sub> .	TAKE COVER BUT BE ABLE TO OBSERVE THE ENEMY CONTINUOUSLY AND PLACE CONTINUOUS FIRE ON THE ENEMY. 10
F.	WOULD CONTINUE DOING WHAT I HAD BEEN DOING BEFORE THE INCOMING FIRE AND WOULDN'T WORRY ABOUT GETTING BETTER COVER. 0







2,10

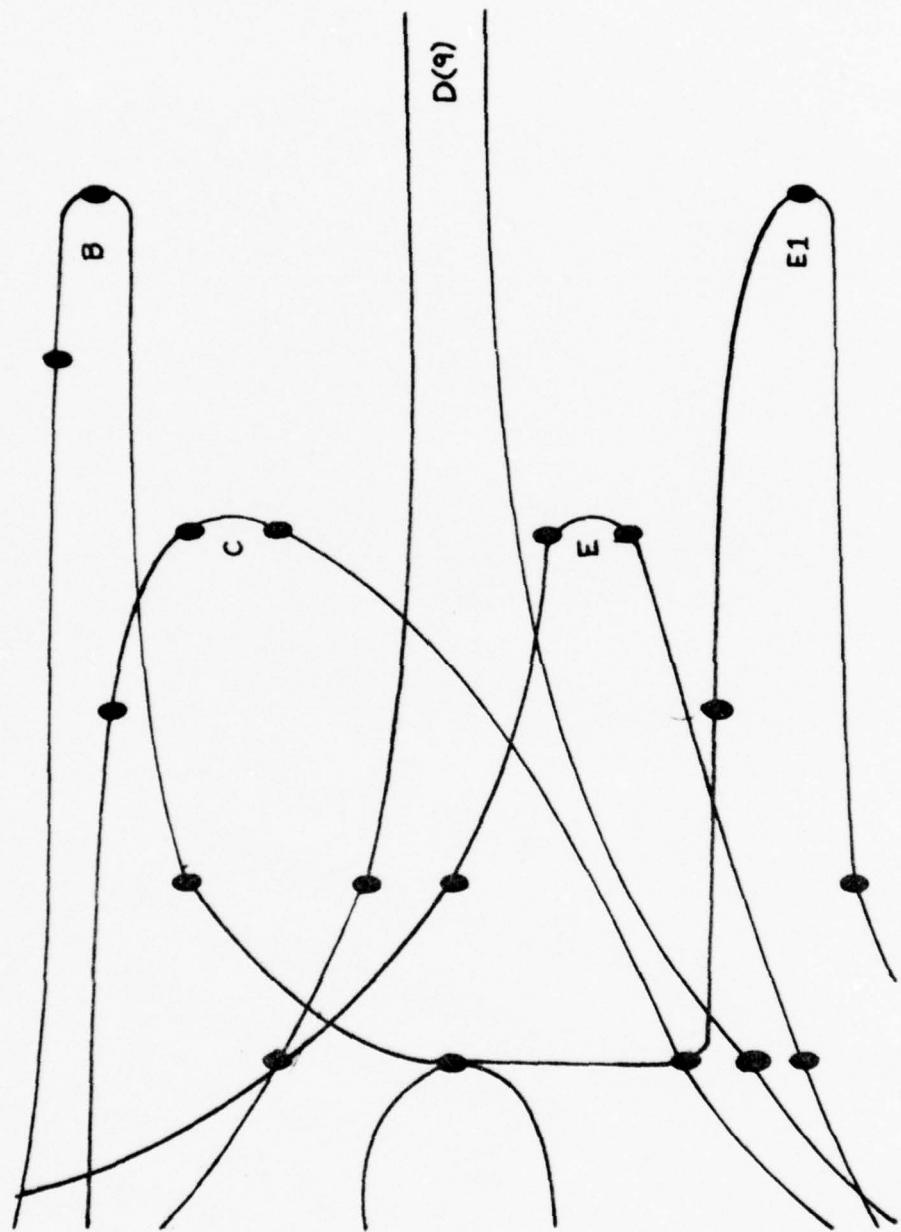
86

74

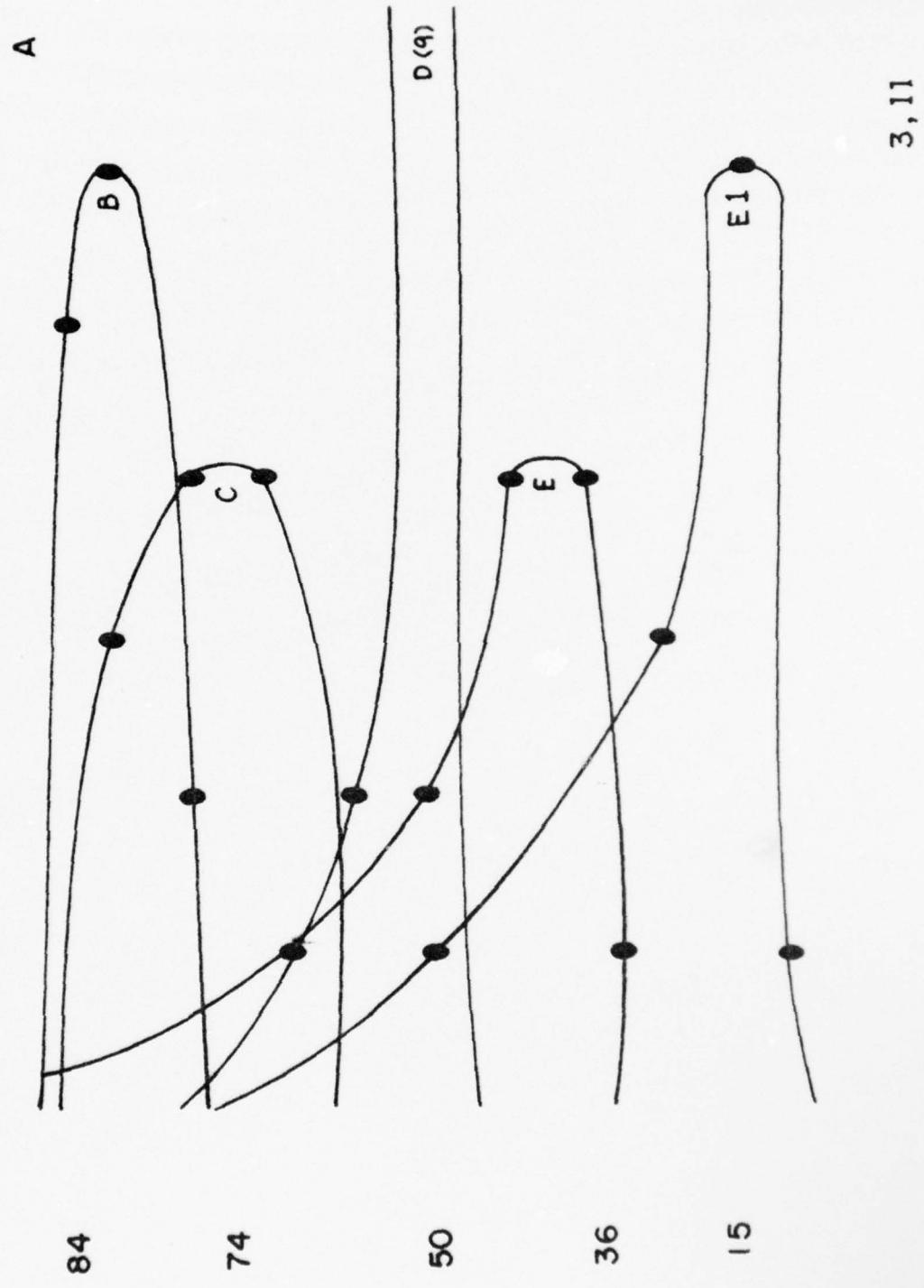
51

36

18



3,11



HIT COUNT SUMMARY FOR MOVING TARGETS

<u>AVERAGE RANGE</u>	<u>ROUNDS FIRED</u>	<u>HITS</u>	<u>HIT PROBABILITY</u>
200	35	8	.228
240	101	13	.129
290	49	7	.143
290	63	4	.0635
340	36	3	.0833

HYPOTHESIS:  $P_h$ , moving = Factor  $\times P_{h, stat}$

FACTOR IS A FUNCTION OF RANGE, CROSSING VELOCITY, AND WEAPON SYSTEM.

## RELIABILITY OF SMALL ARMS

### (DEFINITION OF TERMS)

- STOPPAGES - REDUCIBLE MALFUNCTIONS RESULTING IN  
TIME DELAY.
  
- PARTS REPLACEMENT - (DOMINANT) TOTAL SYSTEM FAILURE.
  
- EFFECTS ON ACCURACY - NOT CONSTITUTING A SYSTEM FAILURE.

JUDGMENTAL STUDIES

INFANTRY AGENCY

1100-1130 - 17 June 1971

YESTERDAY IN DISCUSSION OF THE ASARS II STUDY PLAN I PRESENTED  
WHAT WERE THEN CALLED RELATED STUDIES.

SLIDE 1 ON

THESE RELATED STUDIES ARE DISCUSSED IN DETAIL IN ANNEX K TO ASARS I.  
I WILL DESCRIBE EACH OF THESE RELATED STUDIES ONLY IN SUFFICIENT DETAIL  
TO ENABLE OUR COMMON UNDERSTANDING OF THE PROBLEM. IN THIS DISCUSSION I  
WILL DISCUSS NUMBER 7, NON-INFANTRY APPLICATIONS OF SMALL ARMS, LAST  
AND IN SOME GREATER DETAIL.

THE FAMILY OF SUPPORTING WEAPONS AVAILABLE TO THE INFANTRYMAN IS  
RAPIDLY EXPANDING. TERMINALLY GUIDED AND ROCKET ASSISTED PROJECTILES  
GIVE THE INFANTRYMAN POTENTIALLY GREATER AVAILABILITY AND ACCURACY OF  
SUPPORTING FIRES THAN HE EVER ENJOYED BEFORE. IN THE LIGHT OF THESE  
ADVANCES, WILL THE ROLE OF THE SMALL ARMS IN AN INFANTRY BATTALION BE  
CHANGED? THE ANSWERING OF THIS QUESTION IS THE PURPOSE OF THIS FIRST  
STUDY AND WILL BE UNDERTAKEN BY THE INFANTRY AGENCY.

A LOGICAL QUESTION CAN BE ASKED SUCH AS WHAT MATERIEL PENETRATION  
CAPABILITY MUST A SMALL ARM HAVE. ONE IS FORCED TO BRING TO MIND A  
STANDARD OF PENETRATION OF A STEEL HELMET AT SOME SPECIFIC RANGE.  
THE ANSWER TO THIS QUESTION LIES IN THE ANALYSIS OF SMALL ARMS TARGETS  
WITHIN THE FUTURE ROLE DETERMINED BY THE EARLIER STUDY.

SUSTAINABILITY IS THE THIRD LISTED SUBJECT AREA AND WILL INCORPORATE  
NOT ONLY THE WEAPON BUT THE MAN AND HIS AMMUNITION. HUMRRO HAS DONE  
SOME WORK IN THIS AREA; THE MAINTENANCE AGENCY IS WORKING ON THIS REQUIRE-  
MENT FROM THE WEAPON ASPECT; AND THE INFANTRY AGENCY WILL BEGIN WORK  
IN THIS AREA INTENDING TO CALL ON THE SIAF (SMALL INDEPENDENT ACTION  
FORCES) DATA BASE GENERATED FROM VIETNAM.

THE ASPECTS OF VULNERABILITY WHICH ARE APPLICABLE TO THE ASARS EFFORT IN THE EVALUATION OF THE DEGREE OF THE SYSTEM'S (MAN/WEAPON) VULNERABILITY INTRODUCED BY SPECIFIC CHARACTERISTICS OF A WEAPON. THE WORK UNDERWAY TO DEVELOP A SUBSONIC SNIPER ROUND IS AN EXAMPLE OF THIS APPLICATION.

THE FIFTH AREA LISTED IN THIS ASARS I CHART IS AN AREA WHICH WE HAVE SINCE SUCCEEDED IN BREAKING OUT INTO TWO SEPARATE AREAS. BOTH OF THESE AREAS ARE CURRENTLY UNDER DEVELOPMENT AS BRIEFED EARLIER.

THE DEVELOPMENT OF EMPIRICAL DATA FOR INTRODUCTION INTO THE SIMULATION ADDRESSED IN THIS SIXTH SUBJECT LISTING HAS REFERENCE TO THE CREATION OR ACQUISITION OF DATA WHERE KNOWN ACCEPTABLE SOURCES DO NOT NOW EXIST. THE EFFORT TO RELATE THE MOVING TO THE STATIONARY PROBABILITIES OF HIT DISCUSSED EARLIER IS AN EXAMPLE OF THIS EFFORT.

THE EIGHTH AREA, WEAPON WEIGHT, TRANSPORT, AND STORAGE, IS DEPENDENT UPON NUMBER 7'S COMPLETION FOR ITS USE. THE PROBLEM WILL BE ONE OF DETERMINING WHAT LIMITATIONS ON WEAPON WEIGHT MUST BE APPLIED IN ALL APPLICATIONS OF THE SMALL ARMS TO FACILITATE TRANSPORT AND STORAGE UNDER THE CONDITIONS IN WHICH THEY WILL BE EMPLOYED.

NUMBER 9 CONSTITUTES ESSENTIALLY A DOUBLE PROBLEM AS DISCUSSED IN THE INPUTS UNDER DEVELOPMENT PRESENTATION EARLIER. RELIABILITY WILL SIGNIFICANTLY IMPACT ON THE OUTCOME OF THE SIMULATION AS DISCUSSED EARLIER; HOWEVER, MAINTAINABILITY DOES NOT, AT THIS TIME, APPEAR TO BE OF SUFFICIENT POTENTIAL SIGNIFICANCE TO WARRANT ITS INCORPORATION INTO THE SIMULATION. IT WILL BE ADDRESSED, HOWEVER, IN THE JUDGMENTAL STUDY BY THE MAINTENANCE AGENCY.

THE TENTH SUBJECT LISTED, DURABILITY, WILL DEPEND UPON SEVERAL OF THE OTHER RELATED STUDIES, TO INCLUDE NUMBERS 7 AND 11. THIS EFFECT WILL DETERMINE THE REQUIREMENTS FOR DURABILITY DEPENDENT UPON THE APPLICATION, CONTROL AND BOI.

NUMBER 11, LIKE NUMBER 10, IS DEPENDENT UPON NUMBERS 1 AND 7. THESE STUDIES WILL HAVE TO BE COORDINATED AND DEVELOPED IN A LOGICAL SEQUENCE TO PERMIT THEIR INTEGRATION INTO THE OVERALL STUDY.

NUMBER 12 COVERS TWO SEPARATE AND DISTINCT AREAS. MANY ASPECTS OF THE WEAPON COST COULD BE INCORPORATED INTO THE ANALYTICAL PROGRAM USING EXISTING COST MODELS. SUCH INCORPORATION, HOWEVER, MAY PROVE TO ADD TO AN ALREADY LARGE PROGRAM AND MAY WELL BE CONDUCTED SEPARATELY FROM THE PROGRAM UNDER DEVELOPMENT.

AS A MINIMUM, HOWEVER, ASARS MUST BE CAPABLE OF ESTIMATING COSTS FOR THE WEAPONS PERFORMANCE CAPABILITIES AND ITS ALTERNATIVES DEVELOPED. THE TRAINING REQUIREMENTS EFFORTS WILL RELATE WEAPON CHARACTERISTICS TO TRAINING SUPPORT REQUIREMENTS TO ENABLE THESE ASPECTS TO ENTER INTO PRESENTATION OF ALTERNATIVES.

AS THE LAST RELATED STUDY I WILL DISCUSS NON-INFANTRY APPLICATIONS OF SMALL ARMS. THIS STUDY EFFORT WILL BE ACCOMPLISHED BY THOSE AGENCIES WITHIN COMBAT SYSTEMS GROUP, EXCEPT THE INFANTRY AGENCY. THE OBJECTIVE OF THIS STUDY IS SHOWN ON THIS NEXT SLIDE.

SLIDE 2 ON

THIS OBJECTIVE WILL BE PURSUED WITHIN THE SCOPE OUTLINED FOR ASARS II.

SLIDE 2 OFF

TO ASSIST IN ACCOMPLISHMENT OF THIS STUDY, THREE ESSENTIAL ELEMENTS OF ANALYSIS HAVE BEEN SPECIFIED.

SLIDE 3 ON

YOU WILL NOTICE THAT THESE THREE EEA ARE MODIFICATIONS OF THREE OF THE FOUR EEA FOR APPLICATION IN ASARS II AND CDCEC FIELD EXPERIMENTATION.

SLIDE 3 OFF

A STUDY DIRECTIVE SUPPLEMENTING THE INFORMATION AT INCLOSURE 4 TO THE ASARS II STUDY PLAN HAS BEEN DRAFTED AND IS CURRENTLY AT COMBAT SYSTEMS GROUP FOR APPROVAL. THIS DIRECTIVE REQUIRES THAT TWO REPORTS BE SUBMITTED. THE FIRST WILL BE THE FULL REPORT IN THE PROPER FORMAT PRESCRIBED BY INCLOSURE 7 TO THE ASARS II STUDY PLAN AND SUBMITTED NLT 1 OCTOBER 1971. THIS WILL PERMIT INCLUSION OF ANY SIGNIFICANT FACTORS INTO THE SIMULATION. THE SECOND REPORT WILL BE IN LETTER FORM CONFIRMING THAT THE RESULTS OF THE FIRST ARE STILL APPLICABLE OR REFLECTING NECESSARY CHANGES AS APPROPRIATE. THIS SECOND REPORT IS REQUIRED NLT 1 NOVEMBER 1972, TO PERMIT INTEGRATION OF THIS STUDY INTO THE FINAL REPORT.

THIS CONCLUDES THIS PORTION OF THE PRESENTATION. ARE THERE ANY QUESTIONS?

ASARS II RELATED STUDIES

1. ROLE AND EFFECTIVENESS OF SMALL ARMS RELATED TO INFANTRY BATTALION SUPPORTING WEAPONS.
2. PENETRATION OF MATERIEL.
3. SUSTAINABILITY.
4. VULNERABILITY FACTORS.
5. TARGET ACQUISITION AND SUPPRESSION.
6. Ph, Phk, TACTICAL ROF (DEVELOPMENT OF EMPIRICAL DATA).
7. NON-INFANTRY APPLICATIONS.
8. WEAPON WEIGHT, TRANSPORT AND STORAGE.
9. RELIABILITY/MAINTAINABILITY.
10. DURABILITY.
11. WEAPON CONTROL, MANNING, BOI.
12. COST/TRAINING.

NON-INFANTRY APPLICATION OF SMALL ARMS

(OBJECTIVE)

IDENTIFY THOSE PECULIAR NEEDS FOR SMALL ARMS

WITHIN EACH AGENCY CONDUCTING THIS STUDY.

K-2

ESSENTIAL ELEMENTS OF ANALYSIS (EEA)  
FOR NON-INFANTRY APPLICATION STUDY

1. DOES THE ROLE OF SMALL ARMS INDICATED IN ANNEX D OF REFERENCE 1b (ASARS 1) ADEQUATELY DESCRIBE THE ANTICIPATED NON-INFANTRY APPLICATION OF SMALL ARMS?
2. WHAT ARE THE PERFORMANCE CHARACTERISTICS OF SMALL ARMS EMPLOYED IN NON-INFANTRY ROLES WHICH AFFECT COMBAT EFFECTIVENESS?
3. WHAT ARE THE PERFORMANCE CHARACTERISTICS CONSIDERED ESSENTIAL TO SATISFY FUTURE SMALL ARMS REQUIREMENTS?

MEASURES OF EFFECTIVENESS

PROPOSED IN ASARS I

INFANTRY AGENCY

1300-1315 - 17 June 1971

THE NEXT SUBJECT AREA TO BE FORMALLY DISCUSSED IN THIS IPR IS THE MEASURES OF EFFECTIVENESS.

THIS SUBJECT IS ONE THAT HAS AND CONTINUES TO PLAGUE ANALYSIS. ASARS I DID NOT DEFINE MOE BUT DID DESCRIBE EFFECTIVENESS OF SMALL ARMS. THIS DEFINITION IS SHOWN ON THE FOLLOWING SLIDE.

SLIDE 1 ON

PAUSE

THIS DEFINITION IS DEVELOPED IN APPENDIX I MOE TO ANNEX K TO ASARS I. WHAT I WILL ATTEMPT HERE IS TO PRESENT THOSE MOE SPECIFIED IN ASARS I. LATER THESE TERMS WILL BE SUBJECTED TO CRITICAL ANALYSIS.

SLIDE 1 OFF

PRIOR TO PRESENTING THE MOE PROPOSED BY ASARS I, IT IS ESSENTIAL THAT WE ALL AGREE ON THE APPLICATION OF THESE MEASURES.

SLIDE 2 ON

THIS SLIDE SHOWS THE SCHEME FOR APPLICATION OF THE ASARS SIMULATION. IT IS HERE IN THE ANALYTICAL PROGRAM THAT MOE WILL BE APPLIED. THE CRITICAL POINT TO BE MADE AT THIS TIME IS THE INDEPENDENCE, AT THIS EARLY STAGE, OF THE SIMULATION FROM THE ANALYTICAL PROGRAM AND, IN TURN, THE MOE.

SLIDE 3 ON

LET ME CLARIFY THIS POINT BY USE OF THIS SLIDE. THE SIMULATION WILL PRODUCE A HISTORY OF THE BATTLE SIMULATED. IT DOES NOT REALLY MATTER WHAT THE CONTENTS OF THIS HISTORICAL RECORD BE, PROVIDED IT IS A SET OF DATA LARGE ENOUGH TO INCLUDE THAT DATA REQUIRED BY THE ANALYTICAL PROGRAM. THE ANALYTICAL PROGRAM WILL APPLY MOE TO A SELECTED SUBSET OF THE HISTORICAL RECORD AND ADDRESS SPECIFIC ASARS II TASKS. ALTHOUGH IT MAY APPEAR THAT

SUCH AN APPROACH IS WASTEFUL, LET ME EMPHASIZE THAT I AM DISCUSSING MOE AT THIS POINT IN DEVELOPMENT OF THE SIMULATION. THE MOE MUST BE RESPONSIVE TO THE NEEDS OF THE PROGRAM AND MAY HAVE TO BE, AND CAN BE, MODIFIED AS THE DEVELOPMENT PROGRESSES.

SLIDE 3 OFF

SLIDE 2 OFF

HAVING PLACED THE MOE INTO PROPER PERSPECTIVE, ALLOW ME TO PRESENT THE MEASURES PROPOSED BY ASARS I.

ANNEX K TO ASARS I DISCUSSES THREE PROPOSED MOE: MISSION ACCOMPLISHMENT, SMALL ARMS INDICATORS AND SMALL ARMS FACTORS.

SLIDE 4 ON

SLIDE 4 OFF

SIX SMALL ARMS INDICATORS HAVE BEEN IDENTIFIED.

SLIDE 5 ON

PAUSE

AGAIN, THE SAF ARE COMBINATIONS OF THESE SAI.

SLIDE 5 OFF

ASARS I WENT ON TO CONDUCT A DETAILED ANALYSIS OF THESE MOE AND COMPARED MA TO SAI'S.

SLIDE 6 ON

THIS SLIDE PRESENTS THE RESULT OF THE ANALYSIS.

PAUSE

THE RESULT WAS THE RECOMMENDATION THAT MA BE THE PRINCIPLE MOE FOLLOWED BY SAI'S, IF THE FIRST DID NOT PROVE TO BE SUFFICIENTLY SENSITIVE.

THIS COMPLETES THE PRESENTATION OF ASARS I MOE. I WILL BE FOLLOWED  
BY \_\_\_\_\_ WHO WILL PRESENT SYSTEM ANALYSIS GROUP'S PROPOSED  
MOE AND THE FRAMEWORK OF THE ANALYTICAL PROGRAM WHICH WILL APPLY THE  
MEASURES.

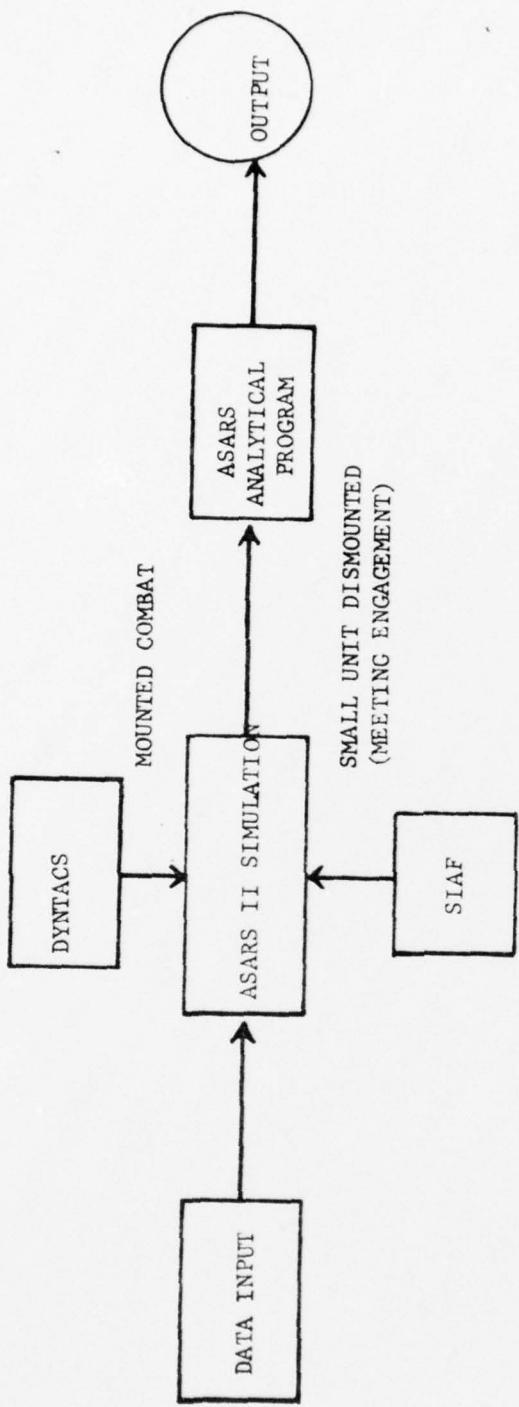
SLIDE 6 OFF

EFFECTIVENESS OF SMALL ARMS

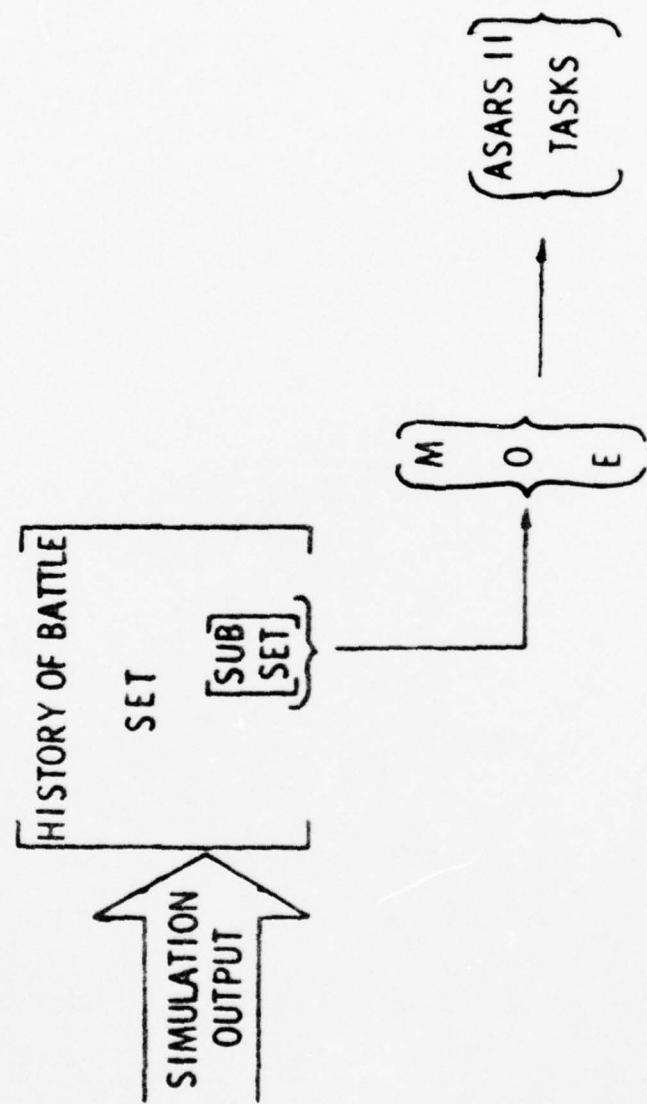
(DEFINITION)

THE EFFECTIVENESS OF SMALL ARMS, WHEN USED IN  
THEIR ENVIRONMENT, IS THE POSITIVE OUTCOME OF THE  
MISSION OF THE SMALL INFANTRY UNITS.

APPLICATION OF ASARS SIMULATION



RELATION OF SIMULATION TO ANALYTICAL PROGRAM AND MOE



MEASURES OF EFFECTIVENESS

(ASARS 1)

1. MISSION ACCOMPLISHMENT (MA) VERSUS PROBABILITY  
OF SUCCESS.
2. SMALL ARMS INDICATORS (SAI).
3. SMALL ARMS FACTOR (SAF) - (A COMBINATION OF SAI(s).

SMALL ARMS INDICATORS

BLUE CASUALTIES

RED CASUALTIES

BLUE SUPPRESSION

RED SUPPRESSION

TIME

DISTANCE

6  
L-5

## COMPARISON OF MOE

MISSION ACCOMPLISHMENT (MA)	MOE	ADVANTAGES	DISADVANTAGES
1. REFLECTS TOTAL ENVIRONMENT OF SA 2. EASILY UNDERSTOOD 3. REFLECTS THE EFFECTS OF SA	PROBABLY MORE SENSITIVE TO CHANGES IN WPNs. CHARACTERISTICS THAN MA	1. POSSIBLE LACK OF SENSITIVITY TO DETECTION OF VARIATIONS IN WPN. CHARACTERISTICS 2. DIFFICULTY IN STATING MISSION IN DETAIL	1. MULTIPLE MOE 2. EXTREME VARIANCE OF IMPORTANCE FROM MISSION-TO-MISSION

MOE PROPOSED BY SAG

SYSTEMS ANALYSIS GROUP

1315-1345 - 17 June 1971

During this briefing Systems Analysis Group conducted a critical analysis of those MOE proposed in ASARS I. Criteria for description of MOE were established and several alternatives presented. Six MOE were proposed for future consideration.

EVALUATION SUMMARY OF MOE FOR ASARS II

Do the MOE Satisfy These Criteria?

Criteria	Is MOE a Random Variable?	Is MOE Mathematically Tractable?	Is MOE Seated in Reality & Measurable?	Is MOE Prime Dimension of Combat?	Does MOE Reflect Resources to Accomplish the "Yield"?	Does MOE Reflect Resources to Interpret the "Yield"?	Does MOE Exhibit Sensitivity	Is MOE Suitable for ASARS II Statistical Analysis?
$\int f(x, z) p(z) dz$	Yes	No	No	Yes	No	No	No	No
Small Arms Indicators (SAI)								
Time Casualties	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Distance	"	"	"	"	"	"	"	"
Suppression	"	No	Unk	No	"	Unk	"	No
Small Arms Factors (SAF)								
SAF R	Yes	No	Unk	Yes	No	No	Unk	No
SAF B	"	"	"	"	"	"	"	"
Mission Accomplishment Break-Point	Yes	Qualified Yes	Yes, but only under Transformation	Yes	Yes	Yes	Yes	Yes
Mission Accomplishment Type II	Yes	Yes	Yes	Yes	Yes	Yes	Unk	Yes
Kill Low	High	High	Yes	Yes	Yes	No	Yes	Yes
Productivity	Yes	Unk	Yes	Yes	No	No	Yes	Yes

M-1

MOE TO BE USED IN ASARS II

INFANTRY AGENCY

1345-1400 - 17 June 1971

DURING THIS PORTION OF THE CONFERENCE, I WILL PRESENT THE INFANTRY AGENCY'S CONCEPT ON THE APPLICATION OF MEASURES OF EFFECTIVENESS IN THE ASARS II STUDY. YOU WILL RECALL THAT IN MY EARLIER PRESENTATION I SHOWED THE ASARS I DEFINITION OF SMALL ARMS EFFECTIVENESS. IT IS PROPOSED THAT A BETTER DESCRIPTION OF THIS EFFECTIVENESS IS GIVEN BY THE FOLLOWING DEFINITION.

SLIDE 1 ON

NOTE THAT BY THE ADDITION OF THE DEGREE OF SATISFACTION WE HAVE ADDED THE ACKNOWLEDGEMENT THAT EFFECTIVENESS IS AT LEAST APPROXIMATED BY A CONTINUOUS FUNCTION.

SLIDE 1 OFF

WITH THIS DEFINITION OF SMALL ARMS EFFECTIVENESS, WE CAN NOW PROGRESS TO A DEFINITION OF A MEASURE OF EFFECTIVENESS.

SLIDE 2 ON

PAUSE

THE UNDERLINED PORTIONS OF THIS DEFINITION EMPHASIZE SOME CRITICAL CHARACTERISTICS OF MOE. THIS DEFINITION SPECIFIES THAT SUCH A MEASURE IS A CONTINUOUS FUNCTION, MUST BE QUANTIFIABLE AND CAN, IN FACT, BE MEASURED.

SLIDE 2 OFF

AT THIS TIME, I WOULD LIKE TO REVIEW THE ANTICIPATED APPLICATION OF THE MEASURE OF EFFECTIVENESS.

SLIDE 3 ON

I WOULD LIKE TO EMPHASIZE ONCE AGAIN THAT THE SIMULATION IS INDEPENDENT OF THE MOE APPLIED BY THE ANALYTICAL PROGRAM. AS SUCH, IT IS NOT NECESSARY FOR THE MOE TO BE PRECISELY SPECIFIED PRIOR TO EARLIER EFFORTS OF THE SIMULATION DEVELOPMENT. THE CONCEPTS GUIDING THE FUTURE DEVELOPMENT OF DETAILED MOE, HOWEVER, ARE OF IMPORTANCE NOW. IT IS THE DESCRIPTION OF THESE CONCEPTS THAT I WILL NOW ADDRESS.

SLIDE 3 OFF

IN ASARS WE ARE NOT CONCERNED WITH HARDWARE ALONE, BUT MUST CONSIDER THE ENTIRE ENVIRONMENT WITHIN WHICH THE SMALL ARM IS EMPLOYED AND IN THIS WEAPON ENVIRONMENT MEASURE ITS EFFECTIVENESS. ALLOW ME TO EXPLAIN THIS PHENOMENA I AM ALLUDING TO BY USE OF THIS NEXT SLIDE.

SLIDE 4 ON

THIS SLIDE DEPICTS THE MAN/WEAPON SYSTEM AS A COMBAT SYSTEM AND A CONTRIBUTING ELEMENT TO AN ORGANIZATION. THE MAN/WEAPON COMBAT SYSTEM CAN BE DIVIDED INTO THREE IDENTIFIABLE BUT NOT UNIQUE ELEMENTS. THE AREA OR ELEMENT WHICH WE IN ASARS II ARE TARGETED AGAINST IS THE SHADED AREA OF THE WEAPON AND INFLUENCING ASPECTS OF MAN AND THE ENVIRONMENT. THE CRITICAL ASPECT HERE IS THAT WE CANNOT TREAT THE WEAPON IN ISOLATION OF THE MAN OR THE ENVIRONMENT. THE MAN WILL INTERFACE WITH THE WEAPON AS REFLECTED IN TRAINING, LOGIC, AIMING ERROR, ETC. THE ENVIRONMENT WILL INTERFACE IN COMBAT OPERATIONS, WEATHER, TERRAIN, ETC. WHAT WE MUST MEASURE IS THE CONTRIBUTION THIS SHADED AREA MAKES TO THE TACTICAL OUTCOME OF THE BATTLE TAKING INTO CONSIDERATION A VARIETY OF POSSIBLE ORGANIZATIONS. THIS THEN MUST BE THE OBJECTIVE OF ANY MOE.

AS DISCUSSED IN ASARS I, THE IDENTIFICATION OF THIS DEGREE OF ACCOMPLISHMENT SHOULD WELL BE MISSION ACCOMPLISHMENT. AS ALSO POINTED OUT EARLIER, HOWEVER, MISSION ACCOMPLISHMENT DOES NOT CONSTITUTE A MEASURABLE QUANTITY AND THUS CANNOT BE THE MOE.

SLIDE 4 OFF

WHAT MUST BE FOUND THEN ARE THE MEASURABLE ELEMENTS WHICH GO TO MAKE UP MISSION ACCOMPLISHMENT.

SLIDE 5 ON

LET US FIRST NOTICE THAT OUR ULTIMATE OBJECTIVE IS TO MEASURE THE DEGREE OF ACCOMPLISHMENT OF A UNIT MISSION. THIS IMMEDIATELY DIRECTS THAT THE MISSION IS CENTRAL TO ANY MEASURE. WE HAVE DISCUSSED YESTERDAY HOW THREE COMBAT OPERATIONS WILL BE SIMULATED: ATTACK, DEFENSE, AND MEETING ENGAGEMENT. WE CANNOT EXPECT, ESPECIALLY IN THE MEETING ENGAGEMENT, TO ARM EACH SOLDIER WITH THE OPTIMAL WEAPON FOR EACH OF THESE OPERATIONS, SO WE MUST DEVELOP MEASURES WHICH WILL APPLY IN ALL OPERATIONS ALTHOUGH NOT NECESSARILY TO THE SAME DEGREE.

WITH THESE REQUIREMENTS CLEARLY DEFINED, WE CAN NOW PROGRESS TO THE DEVELOPMENT OF SPECIFIC MEASURES OF EFFECTIVENESS. PERHAPS IT WOULD BE MORE MEANINGFUL AND TECHNICALLY ACCURATE TO DESCRIBE THESE FACTORS AS MEASURES OF ELEMENTS CONTRIBUTING TO MISSION ACCOMPLISHMENT.

SLIDE 5 OFF

SLIDE 6 ON

YOU WILL RECALL THAT DURING THE COURSE OF THE TWO PRECEDING PRESENTATIONS SEVERAL MEASURABLE QUANTITIES OR RATIOS WERE ADVANCED. WE TAKE NO EXCEPTION TO THESE AND FEEL THAT THE TIME IS NOT YET RIGHT TO IDENTIFY THOSE SPECIFIC CONTRIBUTING ELEMENTS WHICH MUST BE QUANTIFIED. FURTHERMORE, THE TIME WILL NOT BE RIGHT UNTIL THE SIMULATION MODEL NEARS COMPLETION AND WILL PROBABLY HAVE TO BE REEVALUATED FOLLOWING SENSITIVITY RUNS. THE CONCEPT FOR THEIR INTEGRATION INTO THE ASARS EFFORT, HOWEVER, CAN AND SHOULD BE OUTLINED AT

THIS POINT. THIS IS ESSENTIALLY THE FRAMEWORK OF THE ANALYTICAL PROGRAM TO APPLY THE MOE.

HOW VARIOUS MEASURES ARE TO BE COMBINED WILL DEPEND UPON THE SPECIFIC COMBAT OPERATION BEING CONDUCTED, WHETHER IT BE THE INVASION OF NORMANDY OR THE ATTACK ON A BUNKER, AND SHOULD BE ASSOCIATED IN THE FOLLOWING MANNER:

SLIDE 7 ON

THE FIRST SET SHOWN IS THAT SET SELECTED FROM WITHIN THE HISTORICAL RECORD OF THE BATTLE. ELEMENTS OF THIS SET WILL BE COMBINED IN VARIOUS MANNERS TO PRESENT MEASURE OF CONTRIBUTING ELEMENTS, "F" SUBSCRIPT. THESE, GENTLEMEN, ARE THE MEASURES OF EFFECTIVENESS WHICH HAVE UNDERGONE EARLIER DETAILED DISCUSSION. TO ARRIVE NOW AT MISSION ACCOMPLISHMENT THE FOLLOWING PRESCRIBES A POSSIBLE SOLUTION. BY THE APPLICATION OF MILITARY JUDGMENT ASSIGN VALUES TO WEIGHTING FACTORS  $A_I$ ,  $B_I$ , AND  $C_I$ . FOR ATTACK, DEFENSE AND MEETING ENGAGEMENTS WHICH WILL DETERMINE THE DEGREE OF CONTRIBUTION THAT EACH OF THE  $F$  SUB  $I$  (B) (MOE) CONTRIBUTE TO THEIR RESPECTIVE RESTRICTED MISSION ACCOMPLISHMENT. FOR EXAMPLE, IF A RATIO OF RED CASUALTIES TO BLUE AMMUNITION EXPENDITURE WERE DESIGNATED AS MOE NO. 1 I.E.: F, IT WOULD BE REASONABLE THAT THIS RATIO BE MORE IMPORTANT IN THE ATTACK THAN IT WOULD IN THE DEFENSE. AS A RESULT  $A_I$  WOULD BE GREATER THAN  $B_I$ . THE QUANTIFICATION OF THE DEGREE OF SPECIALIZED MISSION ACCOMPLISHMENT WOULD BE ACCOMPLISHED IN STEP FOUR. THE PROBLEM NOW RESOLVES ITSELF TO DETERMINE THE RELATIVE CONTRIBUTION OF EACH OF THE COMBAT OPERATIONS TO A UNIQUELY IDENTIFIED MISSION.

SLIDE N7A OFF

SLIDE N7B ON

BY APPLYING MILITARY JUDGMENT AGAIN WE WILL DETERMINE VALUES FOR WEIGHTING FACTORS  $A_M$ ,  $B_M$ , AND  $C_M$  WHICH DESCRIBE THE DEGREE OF CONTRIBUTION OF EACH COMBAT OPERATION TO THE UNIQUE MISSION DESCRIBED. I WOULD LIKE TO EMPHASIZE THAT IN BOTH INSTANCES OF APPLICATION OF MILITARY JUDGMENT, THE DEGREES OF CONTRIBUTION HAVE BEEN SIMPLIFIED TO THE MAXIMUM EXTENT POSSIBLE AND PERMIT THEIR ASSIGNMENT INDEPENDENT OF ANY OUTPUTS. THE SIXTH AND FINAL STEP IS A SIMPLE SUMMATION TO ARRIVE AT A FINITE VALUE WHICH WILL PERMIT THE ASSOCIATION OF VARIOUS ALTERNATIVE COURSES OF ACTION. I AM AWARE THAT THIS PROPOSAL ON THE SURFACE SUMS RADICAL AND ITS GOAL HAS BEEN SOUGHT BUT NEVER SUCCESSFULLY ACCOMPLISHED TO DATE; BUT ONCE AGAIN, THIS IS SIMPLY A PROPOSAL.

THIS CONCLUDES THE FORMAL PRESENTATIONS ON MOE. IF THERE ARE NO QUESTIONS, WE WILL GO ON TO THE LAST SUBJECT, WEAPONS PERFORMANCE CHARACTERISTICS.

EFFECTIVENESS OF SMALL ARMS

(DEFINITION)

THE DEGREE TO WHICH SMALL ARMS SATISFY A NEED.

MEASURES OF EFFECTIVENESS

(DEFINITION)

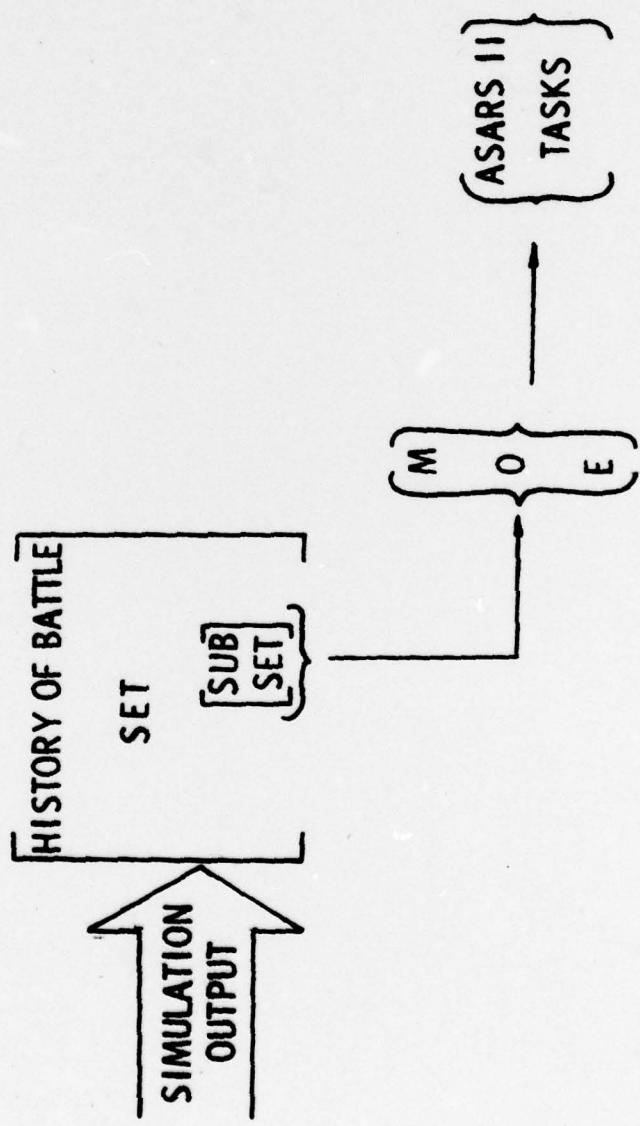
A QUANTIFIABLE VARIABLE EVALUATING THE

CONTRIBUTION OF A SUBJECT ELEMENT TOWARDS SATISFACTION

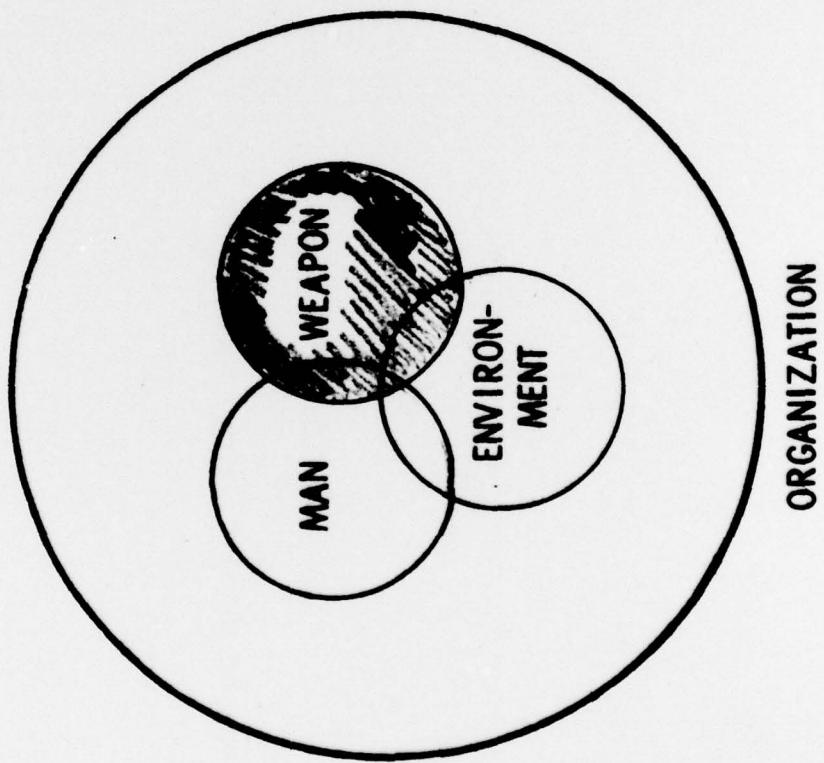
OF A CLEARLY DEFINED NEED AMENABLE TO APPLICATION AGAINST

A STANDARD.

RELATION OF SIMULATION TO ANALYTICAL PROGRAM AND MOE

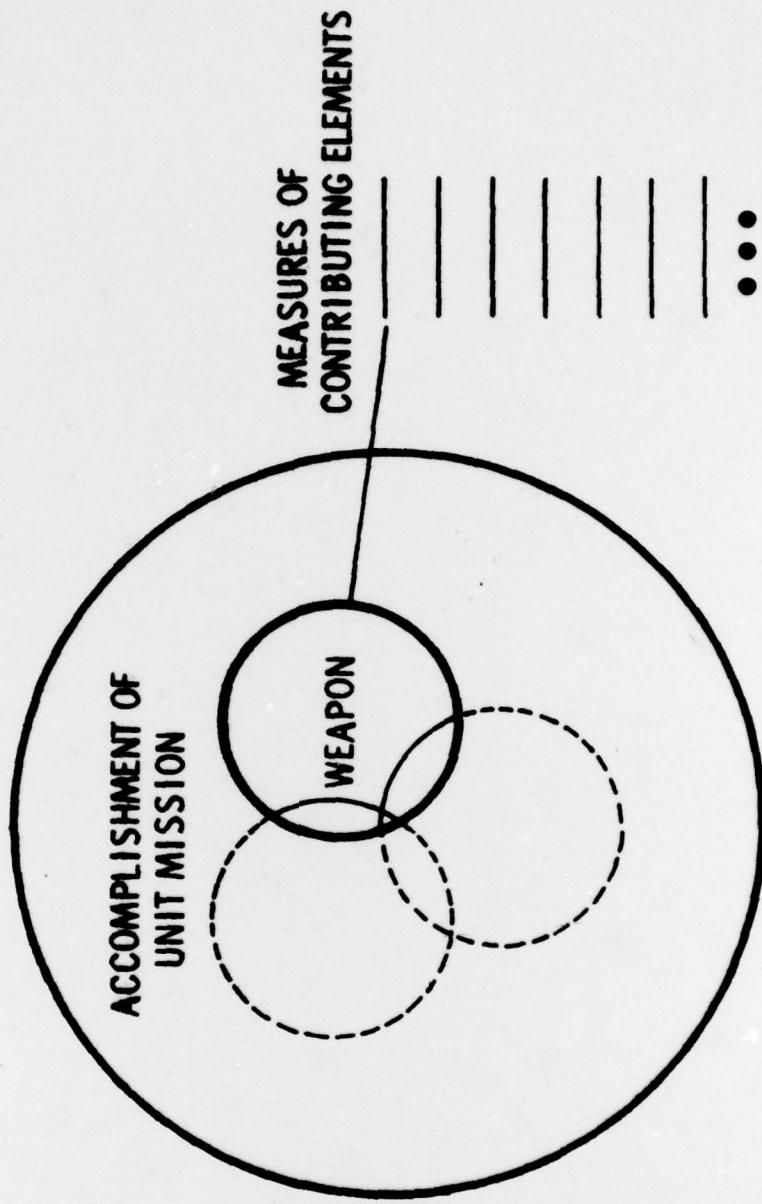


MAN/WEAPON COMBAT SYSTEM



11.11

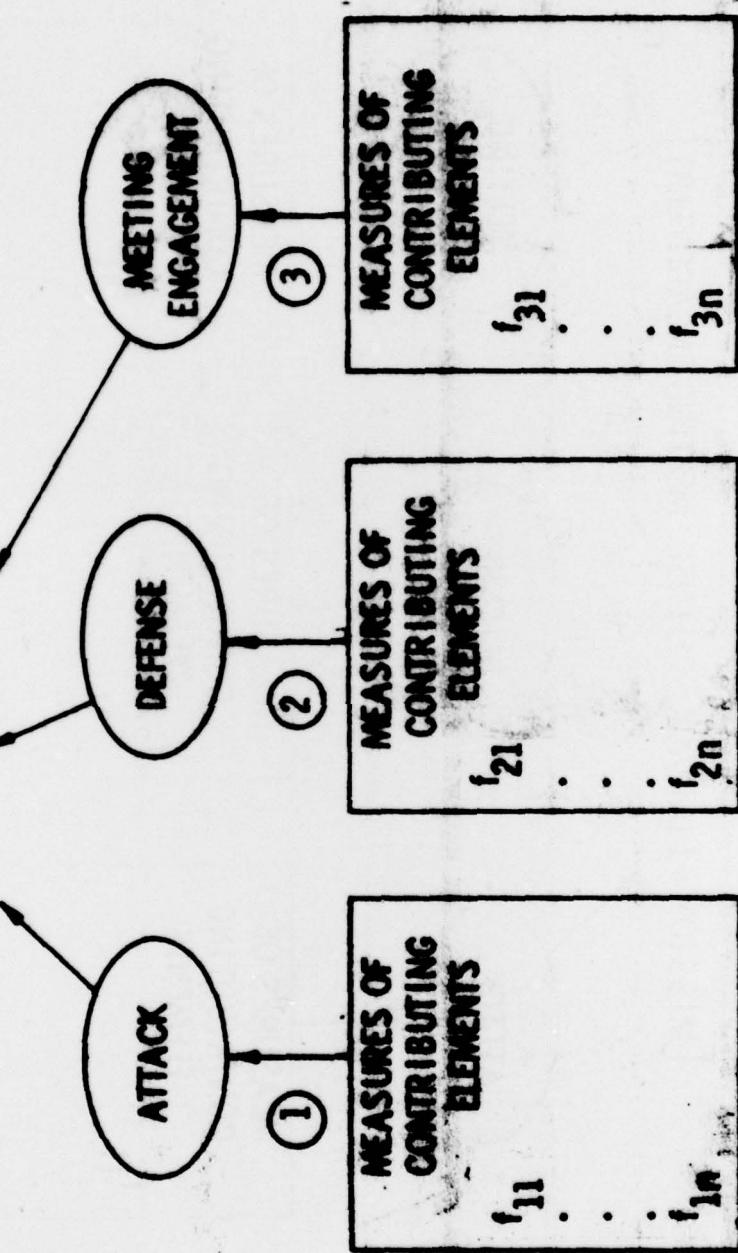
MISSION ACCOMPLISHMENT



N-5

## MISSION ACCOMPLISHMENT

[MISSION - 1 (ATTACK, DEFENSE, MEETING ENGAGEMENT)]



MEASURES OF CONTRIBUTING ELEMENTS -

$f_{11}, \dots, f_{1n}, f_{21}, \dots, f_{2n}, f_{31}, \dots, f_{3n}$

W-6

### FRAMEWORK FOR ANALYSIS

1.  $\{o_1, \dots, o_n\}$  - basic outputs of the model
2.  $\left\{ f_1(o_1, \dots, o_n) \atop f_m(o_1, \dots, o_n) \right\}$  - measures of contributing elements
3. Determine:  $a_i, b_i, c_i$  ( $i = 1 \text{ to } m$ ) by military judgment for attack, defense, and meeting engagement.
4.  $MA_{\text{attack}} = \sum_{i=1}^m a_i f_i \quad \sum a_i = 1.0$   
 $MA_{\text{defense}} = \sum_{i=1}^m b_i f_i \quad \text{where } \sum b_i = 1.0$   
 $MA_{\text{meeting engagement}} = \sum_{i=1}^m c_i f_i \quad \sum c_i = 1.0$

FRAMEWORK FOR ANALYSIS (Continued)

5. Determine  $a_u$ ,  $b_u$ ,  $c_u$  by military judgment of contributions in attack, defense, and meeting engagement.
6. Mission Accomplishment(unique) =  $a_u \text{ MA}_{\text{attack}} + b_u \text{ MA}_{\text{defense}}$   
+  $c_u \text{ MA}_{\text{meeting engagement}}$   
where  $a_u + b_u + c_u = 1.0$

WEAPONS PERFORMANCE CHARACTERISTICS

INFANTRY AGENCY

1400-1415 - 17 JUNE 1971

THIS LAST PRESENTATION IS ONE WHICH WAS ADDED SINCE THE PUBLICATION OF THE PRE-IPR INFORMATION PACKET AND DEALS WITH WEAPONS PERFORMANCE CHARACTERISTICS. WEAPONS PERFORMANCE CHARACTERISTICS UNDERWENT INTENSIVE INVESTIGATION IN BOTH THE SAWS AND ASARS I STUDIES. IN DEPTH DISCUSSION OF THESE CHARACTERISTICS WILL BE FOUND IN ANNEX L AS WELL AS ANNEX K OF THE ASARS I FINAL REPORT.

THE FIRST STEP IN ANY ANALYSIS OF WEAPON PERFORMANCE CHARACTERISTICS MUST BE AN EFFORT TO CATEGORIZE THE MASS OF WEAPONS UNDER REVIEW. ASARS I ESTABLISHED THE FIVE FOLLOWING CATEGORIES OF BASIC WEAPONS.

SLIDE 1 ON

IF A FLASH GORDON TYPE LASER WERE DEVELOPED, IT TOO COULD FIT INTO ONE OF THESE CATEGORIES.

SLIDE 1 OFF

ASARS I FURTHER CONCLUDED THAT A SUFFICIENT BASIS EXISTED FOR THE INVESTIGATION OF SMALL ARMS EFFECTIVENESS IN TERMS OF THREE BASIC PERFORMANCE CHARACTERISTICS.

SLIDE 2 ON

THIS SLIDE LISTS THE THREE WEAPONS PERFORMANCE CHARACTERISTICS.

SLIDE 2 OFF

ASARS I WENT ON TO LIST SMALL ARMS CHARACTERISTICS IN CATEGORIES OF PERFORMANCE AND PHYSICAL.

SLIDE 3 ON

THE WORDS GROSS AND CONTRIBUTING HAVE BEEN ADDED TO REFLECT THAT THE PHYSICAL CHARACTERISTICS COMBINE IN VARIOUS MANNERS TO MANIFEST THEMSELVES

IN A GROSS PERFORMANCE CLASSIFICATION. THE CHARACTERISTICS DEPICTED HERE HAVE UNDERGONE, AND WILL CONTINUE TO UNDERGO, REVISION PARTICULARLY IN THE PHASE C MODEL EXPANSION WHEN REQUIREMENTS TO DESCRIBE A WEAPON'S PERFORMANCE MUST BE ACCOMPLISHED THROUGH PROGRAMMING ITS PHYSICAL CHARACTERISTICS.

THESE CHARACTERISTICS WILL BE USED IN THE MODEL EXPANSION AND MODIFIED AS NECESSARY TO SUPPORT THE DEVELOPMENT.

SLIDE 3 OFF

IF THERE ARE NO QUESTIONS WE WILL TAKE A TEN MINUTE BREAK AND RETURN FOR DISCUSSION OF TOPICS AT YOUR SELECTION AS NECESSARY.

BASIC WEAPON CATEGORIES

SINGLE PROJECTILE CARTRIDGES IN SEMIAUTOMATIC FIRE.

SINGLE PROJECTILE CARTRIDGES IN AUTOMATIC BURST FIRE.

MULTIPLE PROJECTILE (SALVO) CARTRIDGES IN SEMIAUTOMATIC FIRE.

AIMED MACHINEGUN FIRE INTO AN AREA TYPE TARGET.

AIMED FIRE OF A FRAGMENTING PROJECTILE INTO AN AREA TYPE TARGET.

WEAPON PERFORMANCE CHARACTERISTIC CATEGORIES

1. ABILITY TO HIT A TARGET.
2. ABILITY TO INCAPACITATE A TARGET.
3. RATES OF FIRE.

SMALL ARMS CHARACTERISTICS

GROSS PERFORMANCE

ACCURACY ( $P_h$ )

INCAPACITATION ( $P_k$ )

RATE OF FIRE (ROF)

LETHAL AREA ( $A_l$ )

CONTRIBUTING PHYSICAL

ROUNDS IN BURST

PROJECTILE DISPERSION

WEAPON WEIGHT

PROJECTILE WEIGHT

PROPELLANT WEIGHT

WEAPON RECOIL

MUZZLE VELOCITY

STRIKING VELOCITY

CARTRIDGE WEIGHT

ELEVATION ANGLE

RANGE

Figure K-1 - Weapons Characteristics

Annex K - ASARS I Final Report

During this portion of the presentation Systems Analysis Group evaluated those weapons performance characteristics outlined in ASARS I and proposed their modification as reflected on the following slide.

WEAPONS PERFORMANCE CHARACTERISTICS		CAUSES	
RESULTS	LEVEL 1	LEVEL 1	LEVEL 2
LEVEL 1	LEVEL 2	MUZZLE VELOCITY	
		CHANGE IN AIM ERROR	RANGE
			RECOIL
			OPTICS
		RATE OF FIRE	RATE OF FIRE
			PROJECTILE WEIGHT
		LETHALITY	TYPE PROJECTILE
			LETHALITY OF PROJECTILE/
			FRAGMENT
			STRIKING VELOCITY
			DISPERSION
			BURST AREA
			WEAPON WEIGHT
			BURST AREA

 $P_h$  $P_{ch}$  $P_c$ 

821

ASARS II IPR SUMMARY

1. THE ASARS PROGRAM FROM THE SAWS STUDY, 1965, THRU THE ASARS I FINAL REPORT, JUNE 1970, WAS REVIEWED. THE ASSIGNMENT OF PROPENSITY FOR ASARS UNDER ARSAP TO THE INFANTRY AGENCY WAS OUTLINED.
2. THE ASARS II MANAGEMENT PROGRAM AND THE ASARS II INPUT DATA COLLECTION PLAN WERE OUTLINED, AND THEIR CONCEPTS FOR APPLICATION TO THE ASARS II STUDY WERE AGREED TO BY THE IPR PARTICIPANTS.
3. THE ASARS BATTLE SIMULATION DEVELOPMENT THRU PHASE B FLOW CHARTING WAS PRESENTED BY SYSTEMS ANALYSIS GROUP. AT THIS POINT, A PROBLEM OF POSSIBLE SCOPE OF THE SIMULATION, I.E., EXCESSIVE DETAIL, WAS SURFACED. IT WAS OPINED BY SOME MEMBERS OF THE IPR BOARD THAT INPUT DATA DOES NOT EXIST TO SATISFY THE NEEDS OF THE SIMULATION CURRENTLY UNDER DEVELOPMENT. IT WAS FURTHER OPINED THAT THE SIMULATION OUTLINED WENT INTO TOO MUCH DETAIL OF ASPECTS OF THE BATTLE WHICH COULD BE EXCLUDED. THE DISCUSSION SURROUNDING THIS SIMULATION DEVELOPMENT COULD BE SUMMARIZED AS THE NEED EXISTS TO REVIEW THE ASARS SIMULATION DEVELOPMENT UPON COMPLETION OF PHASE C FLOW CHARTING AND IDENTIFICATION OF ALL THE INPUT REQUIREMENTS. AT THIS TIME, IT MAY BE NECESSARY TO BLOCK OFF SPECIFIC AREAS OF THE SIMULATION, BUT THE GROWTH POTENTIAL SHOULD BE RETAINED. THIS ANALYSIS SHOULD BE CONDUCTED BY A COMBINED GROUPING OF INFANTRY AGENCY, SYSTEMS ANALYSIS GROUP, AND ARMY MATERIEL COMMAND. IT WAS FURTHER CAUTIONED THAT PARTICULAR CARE BE EXERCISED TO INSURE THAT SIDE ISSUES (SUPPORTING FIRES, ETC.) DO NOT DRIVE THE MODEL.

4. THE ASARS INPUT DATA DEVELOPED AND UNDER DEVELOPMENT WAS REVIEWED AND ITS PROGRAMMED INTEGRATION INTO THE EFFORT ACCEPTED BY THE REVIEW BOARD. IT WAS DIRECTED THAT AS SOON AS NEEDS FOR INPUT DATA WERE IDENTIFIED, THE AGENCIES REASONABLY EXPECTED TO FULFILL THESE REQUIREMENTS SHOULD BE NOTIFIED.

5. THE RELATED AND JUDGMENTAL STUDIES TO SUPPORT THE ASARS II EFFORT WERE OUTLINED. IT WAS FURTHER DIRECTED THAT FORMAL TASKING LETTERS IMPLEMENTING SPECIFIC PORTIONS OF THE ASARS II STUDY PLAN AND THE ASARS I FINAL REPORT SHOULD BE DIRECTED TO THOSE AGENCIES RESPONSIBLE FOR COMPLETION OF THESE JUDGMENTAL STUDIES AS SOON AS POSSIBLE OVER THE AGENCY COMMANDER'S SIGNATURE.

6. MEASURES OF EFFECTIVENESS FOR APPLICATION IN THE ASARS II STUDY EFFORT WERE OUTLINED. IT WAS AGREED THAT THE SPECIFIC DESIGNATION OF THOSE MEASURES TO BE APPLIED AT THIS TIME WAS NOT REQUIRED. IT WAS FURTHER AGREED THAT THE FRAMEWORK FOR DEVELOPMENT OF THE REQUISITE MOE SHOULD BE TARGETED TOWARDS EVALUATING SOME DEGREE OF MISSION ACCOMPLISHMENT.

7. THE WEAPONS PERFORMANCE CHARACTERISTICS OUTLINED IN THE ASARS I FINAL REPORT WERE REVIEWED FOR THE IPR MEMBERS. IT WAS AGREED THAT THOSE WEAPONS PERFORMANCE CHARACTERISTICS AND THE DEFINITIONS FOUND IN ANNEX K AND ANNEX L OF THE FINAL REPORT FOR ASARS I WOULD BE USED AS A POINT OF DEPARTURE FOR APPLICATION IN ASARS II. THESE DEFINITIONS MUST BE REVIEWED WITH THOSE SPECIFIED BY THE AMC AGENCIES WHO WILL BE PROVIDING THE DATA TO INSURE AGREEMENT. THE PHYSICAL CHARACTERISTICS OUTLINED IN THESE REFERENCES WOULD BE MODIFIED AS REQUIRED TO SUPPORT THE PHASE C MODEL EXPANSION.